FORESTRY ABSTRACTS

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CHEMICAL METHODS FOR THE CONTROL OF WEEDS IN FOREST NURSERIES

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The removal of weeds from forest nursery seedbeds by hand or mechanical methods is an expensive operation. In conifer seedbeds, where the seed is often broadcast, it may amount to 50% of the cost of producing two-year-old stock for planting. Even in drill-sown crops, mechanical cultivation is not practicable until the seedlings are about 1 to 1½ in. high and have developed tough stems [32]. Hand weeding during the early stages of seedling tree development has been estimated to cost up to £200 per acre in Great Britain and $150 per acre in the U.S.A. [32]. In addition to the high cost, this method may destroy up to 15% of the seedlings [8]. In less valuable crops such minor losses are unimportant, but in a crop that is worth at least £1,500 to £2,000 per acre their elimination is clearly desirable.

The high value of the crop, and the necessity for weed control in the early stages, make it possible to use chemical methods which would be uneconomic in agricultural crops. It is therefore surprising that so little attention has been given to the problem. The work that has been done has been concerned chiefly with the development of soil treatments which would kill weed seeds or inhibit their germination without affecting the tree crop. The techniques evolved have been based on adaptations of soil treatments for fungus control and of chemical methods used for weed control in agriculture. None of the soil treatments, which depend for their action on differences in the degree of chemical toxicity to tree seedlings and weeds before or immediately after germination, have proved wholly satisfactory. The use of contact sprays to destroy weeds emerging before the crop, has been more successful, but the most striking results have been obtained by post-emergence spraying of conifer seedlings with petroleum oils.

Mayr in 1909 [23] suggested the application of boiling water to seedbeds after sowing, and later Scott [27] showed that steam sterilization of the soil killed the weed seeds and cost about the same as hand weeding. Hartley [15] and Hartley and Pierce [16], however, were the first to mention the possibilities of chemical weed control in coniferous seedlings, reporting that H_2SO_4, applied to the soil as a disinfectant to control damping-off fungi, also reduced weed growth. The use of H_2SO_4 as a pre-sowing treatment was also tested by several other workers [20, 22, 37], but on the whole the results proved disappointing. In agriculture, H_2SO_4 is used as a selective contact spray for the destruction of dicotyledonous weeds in cereal crops, while in horticultural crops it is often used as a pre-emergence spray for the control of annual weeds that germinate before the crop. Scandinavian work, quoted by Vidme [35], shows that H_2SO_4 sprays severely injure 4-year-old Spruce plants, but methods based on application just before or soon after the crop emerges do not appear to have been tested.

Copper sulphate, the first selective weedkiller to be discovered, has also been tried as a seedbed treatment. Steven [29, 30] found that if the soil used for covering the seedbeds was treated with 1% $CuSO_4$ and then dried before application, weed growth was reduced, but *Picea sitchensis*, one of the conifers most sensitive to Cu, was unaffected. Direct treatment of the seedbeds after sowing

or covering, eliminated weeds for two years but caused the soil to cake and seriously affected the germination of the Spruce. Treatment of the bed before sowing was more promising, but still unsatisfactory, as it delayed the germination of the tree seeds. Kitchin [20] and Wahlenberg [36] have compared $CuSO_4$ with Zn salts and found it less selective. More recent work in the agricultural field has shown that $Cu(NO_3)_2$ and $CuCl_2$ are quicker acting and more selective than the sulphate as post-emergence sprays [5]. The possibilities of using these salts as selective sprays in forest nurseries have not been investigated, although preliminary trials by Vidme [35] indicate that they might be useful for *Picea abies*.

The Zn content of conifers is very high, and as early as 1885 Baumann [3] showed that conifers in general, and *Pinus sylvestris* and *Picea abies* in particular, were exceptional in the amount of $ZnSO_4$ that they could tolerate in nutrient culture solution. This property of conifers has been used in the development of soil sterilization techniques. Hartley [15] observed in his trials with disinfectants that the application of about 8 g. of $ZnCl_2$ per sq. ft. of bed, checked the growth of grasses and *Mollugo verticillata*, but had no effect on *Pinus resinosa*. In Sweden, Juhlin-Dannfelt [18, 19] showed that $ZnSO_4$ solutions applied at the time of sowing decreased weed growth by 50%, while in America, Kitchin [20] and Wahlenberg [36] carried out detailed comparisons of $ZnCl_2$ and $ZnSO_4.7H_2O$, and Wahlenberg developed a method using the hydrated sulphate, which resulted in a considerable saving of hand weeding. Large-scale applications of the method in nursery practice were, however, not as successful as the experimental results had promised. Results vary with soil type, and although the soluble Zn is gradually leached from the soil, the insoluble complexes formed in the soil accumulate and necessitate the use of lower doses for each successive crop. McKellar [23] also compared $ZnSO_4$ and $ZnCl_2$, and showed that on the basis of equivalent Zn contents the chloride was the more toxic to *Pinus caribaea*. This finding is in general agreement with Wahlenberg's results, although he failed to compare the chemicals on the basis of their Zn content. The $ZnSO_4$ treatment stimulates Pine germination both by reducing the germination time and by increasing the numbers that emerge. It appears to have no harmful effect on *Picea engelmanni*, but reduces the germination of *Thuja plicata*, whose susceptibility has been attributed by several workers to its thin seed-coat. It is the most promising soil treatment so far developed for weed control, but has never been used on an extensive scale. This is presumably because the dosage required varies with soil type and management, so that detailed experiments would be required before the treatment could be applied to any particular site.

Several other chemicals have been suggested as possibilities for seedbed treatment. Riker [25], for instance, observed that the fungicide tetramethyl thiuram disulphide was effective not only against damping-off fungi but also in preventing the germination of many weeds. $CaCN_2$ [35] and $NaClO_3$ [11] have also been recommended. Little work has been undertaken, but it would appear that both are best applied a few weeks before the seed is sown.

During the last decade there have been striking developments in the science and application of selective phytotoxicity. The chemicals most extensively used in agriculture at the present time are the dinitro compounds, 3,5-dinitro-*o*-cresol (DNOC) and 2,4-dinitro-6-secondary butyl phenol (DNBP); the growth-regulating substances 2,4-dichlorophenoxyacetic acid (2,4-D or DCPA), 2-methyl-4-chloro-phenoxyacetic acid (MCPA) and 2,4,5-trichlorophenoxyacetic acid (TCPA); and certain petroleum-oil fractions. All of these substances have been tried as selective weedkillers in forest nurseries, but the outstanding success of the petroleum oils in conifer nurseries has completely overshadowed the work with the dinitro and growth-regulating compounds.

The nitrophenols do not appear to be selective enough in their toxic action for practical use [28]. There are, however, differences in the reactions of different tree species, *Pinus sylvestris* being more resistant than *Picea sitchensis* and *Larix leptolepis* [28, 35].

The growth-regulating substances are absorbed through both roots and shoots and may be applied either to the seedbed or to the growing plants. The few field trials that have been reported [1, 2, 31] do not suggest that they are very effective. This is partly because tree species are themselves too susceptible, and partly because growth-regulating substances are not effective against annual grass weeds.

The possibility of using mineral-oil fractions as selective weedkillers was first demonstrated by Loomis and Noecker [21] when they found that certain kerosenes of low 'unsaturate' content killed

dandelions in blue-grass (*Poa pratensis*) lawns. The large-scale use of oils, however, followed the discovery in 1943 that 'stove oil' killed weeds in carrot crops without seriously injuring the carrots. Subsequently, many types of oil fraction were tested and it was found that the kerosenes and mineral spirits* were the most suitable, the latter being less liable to cause crop damage than the heavier fractions. It soon became evident that the tolerance of carrots was shared by other Umbelliferae, and oil spraying was extended to crops such as parsnips, parsley, celery etc. [24]. In addition, different fractions were found to vary in their selective toxicity, and specially prepared oils have been used for weed control in linseed and onions [9].

The U.S. Forest Service first became interested in oils as selective weedkillers when in 1943, as part of the Emergency Rubber Project, a successful method was developed for weeding guayule (*Parthenium argentatum*) by spraying with emulsions of stove oil [4]. In 1945, similar emulsions, applied at the rate of 100 to 400 gal. per acre, were found to be toxic to Pine seedlings at dosages required to kill the weeds [8]. In the same year, however, Gilgut [14] demonstrated the possibility of using mineral spirit (Savasol No. 5) for the control of annual weeds in lining-out beds of many species, and in the following year (1946) independent work in the States of Louisiana [6], Michigan [26] and New York [12] all showed that conifers could be successfully weeded with mineral spirits. The success of the 1946 and early 1947 trials led rapidly to the adoption of oil spraying on a large scale, and in 1948 practically all state and many private nurseries in the U.S.A. were using products of this type on conifer seedlings [8]. The reduction in weeding costs made possible by the use of oil sprays has been estimated at 50–80% and may be more on weedy first-year beds [10, 31]. The possibilities of the method have also been realized in European nurseries; in Norway mineral spirit is now used on a relatively large scale and in Great Britain a considerable amount of experimental work has been completed [37].

At present, oils can only be used on conifers, as the seedlings of hardwood trees are too susceptible [6, 14]. Conifers are not uniformly resistant, however, and while, in general, the order of increasing susceptibility is Pine—Fir—Spruce—Larch, the susceptibility of the crop also depends upon (1) the type of oil applied, (2) the time at which it is applied, (3) the amount applied, and (4) environmental factors at the time of application.

(1) Most of the published work from the U.S.A. has been concerned with the use of mineral spirits of proprietary origin, such as Savasol 5, Stanisol and Varsol, and little attempt has been made to compare their action under different conditions. Depending on the type of crude oil from which they are distilled, the aromatic content of mineral spirits may vary from 10 to 45%, but those which are most suitable as selective weedkillers generally contain 15–20% of aromatics[32]. Only a small proportion of the products used have been produced specifically as weedkillers. Variations in composition may therefore account for some of the differences in the rates of application which have been recommended. There do not appear to be great differences in the selectivity of the various products, however, and the mineral spirits that have been tested in Great Britain [37] have all given very similar results.

(2) The time at which the spraying should be carried out is largely determined by the growth of the weeds, as their resistance increases rapidly with age. The best results for weed control are obtained when the weeds are less than 1 in. high [32]. Tree species also vary in their resistance at different stages of growth [see (3) below]. The time of the first spraying has therefore to be a compromise between the optimum time for weed control and the time at which least damage is done to the tree seedlings. Beds can be almost completely freed of annual weeds for about three weeks by an early spray [7], and subsequent sprayings can be carried out as more weeds germinate. In the Southern States of the U.S.A. an average of 4 applications per season is required. The first application, however, is the critical one, and if a weed population is present before the tree seedlings emerge, the treatment may take the form of a pre-emergence spray. Work in Great Britain suggests that pre-emergence spraying may be very valuable [37]. Stoeckeler [32] considers that oils may kill some of the ungerminated weed seeds in the upper layers of the soil.

* The latter, known also as Stoddard solvents or white spirits, consist of petroleum fractions boiling from about 150 to 195° C. and find their widest application in the dry-cleaning and paint industries. Kerosenes are fractions generally boiling from about 150 to 270° C. 'Stove oil' is a less refined product with a boiling range of 170–300° C.

(3) Emerging seedlings of Pine are severely injured by 15–20 gal. per acre of mineral spirits [8], but slightly older seedlings, in which the seed-coat partially protects the cotyledons, can withstand higher doses. Most conifers seem to increase in resistance during their first summer. There is evidence, however, of a decrease in resistance of Pines in August and September [8]; Eliason [12] also considers 'mature' Pine needles to be less resistant than cotyledons and primary needles, and recommends that the young needles of the second and subsequent years' growth should not be sprayed. In general, however, conifers appear to be most susceptible in their first year.

The amount of oil applied determines the relative damage to trees and weeds. In order to allow for differences in susceptibility of tree species and in the stages of growth of trees and weeds, varying quantities are used. The additional complications resulting from the use of different oils and the influence of environmental factors, make it impossible to generalize with regard to the exact rate of application. The following table, taken from Stoeckeler [32], is an example of the type of recommendation that is now being issued for spray materials of the Stoddard-solvent type:—

APPARENT SAFE DOSAGES OF MINERAL SPIRITS ON CONIFER NURSERY BEDS

Tree species	*Application per acre of mineral spirits*	
	During germination period up to 1 July on first-year seedbeds	*After 1 July on first-year seedbeds and at any time on age classes older than 1 year*
	Gallons	*Gallons*
Pinus banksiana and *resinosa* .	40–75	75–90
Picea pungens, alba and *abies* .	25–40	50–75
Abies balsamea	35–50	50–75

Pines in general appear to be highly resistant, and the recommendations given in the table can probably be regarded as safe for most species. They are in agreement with results obtained for the most important species planted in Britain [37], although Cossitt in the United States [8] recommends only 25 gal. per acre for the first spraying of Southern Pines (*P. palustris, P. caribaea, P. taeda*) 7–10 days after germination, and Eliason [13] advises 20 gal. per acre for *Pinus sylvestris* in its early stages.

Firs appear to be slightly less resistant than Pines, and Robbins *et al.* [26] consider *Pseudotsuga* at least as resistant as *Abies*. Spruces are more susceptible than Pines or Firs in the first year but experiments with *Picea sitchensis* in Great Britain have demonstrated that this species can be safely sprayed with up to 65 gal. per acre seven days after most of the seedlings have emerged [37]. In Norway, Stoddard solvent has been used on 1- to 4- year *Picea abies* at much higher rates without damage [35]. Larches are highly susceptible [33], but Eliason [13] states that they can withstand a single early application of 20 gal. per acre when the seed-coats are still present.

In general, conifers older than one year appear to be more resistant than first-year seedlings. In experiments reported by Day [10] an application of 45–50 gal. per acre to two-year-old transplants caused no injury to *Pinus strobus, P. resinosa, P. banksiana, P. sylvestris, Picea alba, Picea abies* and *Larix decidua*, and Stoeckeler [31] used up to 120 gal. per acre on second-year *Pinus resinosa* without causing appreciable damage. Other species which are recorded as being resistant after transplanting include *Juniperus virginiana, Thuja* sp. and *Picea pungens. Tsuga* sp. suffered slight damage to the new needles and *Taxus* spp. were severely injured [14].

(4) Climatic conditions influence the results of oil spraying. The highest weed kills are obtained, in warm, clear weather [10], and injury to tree seedlings also increases with temperature [32]. Cossitt [8], however, reports successful spraying of Pine with 50–100 gal. per acre at a temperature of 100° F. in June and July. Soil moisture also influences the toxicity of the oil spray [8], and Stoeckeler [32] showed that watering just before spraying reduced the damage to *Pinus banksiana* but did not always reduce weed kill. Heavy shade (16% daylight) has been shown by Stoeckeler [32] to reduce the toxicity of mineral spirit to *Picea alba* without affecting its toxicity to weeds.

Little is known of the factors underlying the variations in conifer resistance. The observations on the importance of soil moisture are interesting in the light of results which show that *Brassica alba*

leaves are less affected by oil when floating in water than when exposed to the air [17], and the suggestion that the selective action of oils may be due in part to differences in the effect on water supply to leaves. This may be related to the observation that frost-resistant weeds are also resistant to oil sprays [12].

Mineral oils, applied at rates sufficient to cover the leaf surfaces, kill a wide range of seedling annual weeds, including such serious forest nursery weeds as *Poa annua* and other annual grasses, *Stellaria media*, *Chenopodium* sp., *Polygonum* sp., *Rumex acetosa*, *Spergula* spp., but have no lasting effect on perennials such as *Agropyron repens*, *Convolvulus* sp. etc. Various resistant weeds have been reported, including Umbelliferae in general, *Trifolium repens*, *Gnaphalium uliginosum* [10], *Matricaria suaveolens* and some other Compositae [14].

The problem of controlling weeds in conifer nurseries has thus been considerably simplified by the use of mineral oils. Less progress has been made in finding a method suitable for hardwood seedbeds, and until such time as selective materials which can be used on these trees are produced, the development of pre-emergence methods appears to be the most promising line of approach.

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ABSTRACT SECTION

0. GENERAL FORESTRY

01. TERMINOLOGY. NOMENCLATURE. BIBLIOGRAPHY. MATHEMATICAL AND STATISTICAL ANALYSIS

See also *For. Abstr.* 12 (Nos. 896–900, 1008, 1137–42).

894. SZYMKIEWICZ, D. Zadania i metody statystyki. [**Problems and methods of statistics.**] *Podręczn. (Ser. D) Inst. Bad. Leśn.* No. 4, 1948. pp. 242. 16 refs. [Pol.] 9 dgms. + gphs.

A posthumously published textbook on the fundamentals of statistics.

02. TEXTBOOKS. DICTIONARIES. LISTS OF VERNACULAR NAMES

See also *For. Abstr.* 12 (Nos. 1137–42).

895. Vade mecum du forestier. [**The forester's vade-mecum.**] Éditions Servir, Besançon. 3rd ed., 1946. pp. 285. [F.] Price *Fr.*210 [*7s. 6d.*]

896. GARCÍA-PIQUERA, C. **A Spanish-English glossary of forestry terminology. V.** *Carib. For.* 11 (1), 1950 (25–37). 28 refs. [U.S. Trop. For. Exp. Sta.]

Cf. *For. Abstr.* 10 (No. 3).

897. Nomenclatura delle specie legnose esotiche coltivate in Italia. [**Nomenclature of exotic woody species cultivated in Italy.**] Ente nazionale per l'unificazione nell'industria, Milan. 1945. pp. 6. [It.] Sold by British Standards Institution, 24–28 Victoria St., London, S.W.1. P.R.

Gives standard trade name, other common Italian and foreign names, scientific name, country of origin and date of introduction into Europe, distribution in Italy and other European countries, character of the wood and uses in country of origin, and notes on the quality of the wood produced in Italy, with examples of its uses, for 58 species.

898. Nomenclatura delle specie legnose che vegetano spontanee in Italia. [**Nomenclature of indigenous woody species in Italy.**] Ente nazionale per l'unificazione nell'industria, Milan. 1945. pp. 23. [It.] P.R.

Standard and common Italian names, foreign and scientific names, geographical distribution and principal uses of 94 species.

899. DREES, E. M. Lijst van boom- en struiknamen van het eiland Timor. [**A list of the names of trees and shrubs from Timor.**] *Rapp. Bosbouwproefsta., Buitenzorg* No. 33, 1950. pp. 61. [Jav.Du.E.] (*Serie vegetatie-onderzoek* No. 1.)

Trees and shrubs are listed (1) under vernacular names (separate lists are given for the 4 dialects), and (2) under family, genus and species, with vernacular names and an indication of the size of the plant. [Cf. *For. Abstr.* 12 (No. 992).]

900. MOLDENKE, H. N., and MOLDENKE, A. L. **The recorded common and vernacular names of members of the Verbenaceae, Avicenniaceae, Stilbaceae and Symphoremaceae arranged according to genera and species. Supplement 1.** *An. Inst. Biol. Univ. Méx.* 20 (1/2), 1949 (113–27). [E.] C.G.B.

Cf. *For. Abstr.* 8 (Nos. 974–5).

05. PERIODICALS. ANNUAL REPORTS

See also *For. Abstr.* 12 (Nos. 903, 1128, 1651).

901. ***Colonial plant and animal products.*** H.M. Stationery Office, London. 1 (1), Jan.–Mar., 1950. pp. 94. Price *5s. 6d.*

The quarterly journal of the Colonial Products Advisory Bureau (Plant and Animal), formerly part of the *Bulletin of the Imperial Institute* (now discontinued).

06. CONFERENCES. PROPAGANDA

902. Metsä kuntoon omin voimin. [**Put your forest in order yourself!**] *Special Suppl.* to *Metsälehti, Helsinki* 1950. pp. 32. [Fi.]

This special supplement, issued in support of the National Forestry 'Week' in June 1950, uses modern illustrative techniques to 'sell' proper forestry practice to the Finnish citizen.

07. EDUCATION AND RESEARCH. ARBORETA. EXPERIMENTAL FORESTS

See also *For. Abstr.* 12 (No. 1546).

903. **Forestry Commission: Report on forest research for the year ending March 1949.** H.M. Stationery Office, London. 1950. pp. 80.

In two parts: (1) work carried out by Forestry Commission staff; (2) research undertaken for the Forestry Commission by workers attached to universities and other institutions.

904. Bundesanstalt für Forst- und Holzwirtschaft, Reinbek bei Hamburg 1930–1950. **[An account of the organization, research and publications of the Bundesanstalt für Forst- und Holzwirtschaft.]** Bundesanst. Forst- u. Holzw. 1950. pp. 32. [G.] P.R.

905. Le Centre Technique Forestier Tropical est à votre service. **[The Tropical Forest Technical Centre is at your disposal.]** *Bois For. Trop.* No. 14, 1950 (110–6). [F.e. span.]

This centre, formerly the 'Station Technique Forestière' of the Station des Essais, Nogent-sur-Marne [cf. *For. Abstr.* 10 (No. 8)] began to operate in January 1950, and its organization is described. Research will be undertaken for private as well as public bodies, and specialists can be supplied for work overseas.

906. HAAN, H. DE. **Wageningen, Netherlands: centre of agricultural science.** Institute of Plant Breeding, Wageningen. 5th ed., 1950. pp. 80 + 1 photo, 1 map.

Includes information on the Instituut voor Bosbouwkundig Onderzoek (Institute of Forestry) and the Bosbouwproefstation T.N.O. (Forest Research Station) (pp. 57–9).

09.1. *Forest History*

See also *For. Abstr.* 12 (No. 1655).

907. HART, C. E. **The verderers and Speech-Court of the Forest of Dean.** John Bellows Ltd., Gloucester. 1950. pp. 70 + 9 photos, 1 map. Price 10s.

908. PARROT, A. G. Histoire de la forêt basque. **[History of the forest of the French Basque region.]** *Trav. Lab. for. Toulouse* 1 (4) Art. 19, [1945?]. pp. 22. [F.]

909. WATSON, J. G. **Some materials for a forest history of Malaya.** *Malay. Forester* 13 (2), 1950 (63–72).

09.2. *Pre-history. Pollen Analyses, etc.*

910. PURI, G. S. **The genus *Buxus* in pleistocene of Kashmir.** *Indian For.* 74 (10), 1948 (1950), (354–7 + 9 photos).

911. CHANEY, R. W. **The ancient forests of Oregon.** Oregon State System of Education, Eugene, Ore. 1948. pp. 56 + 18 photos. 33 refs.

A palaeoecological study.

09.7. *Monographs of Individual Forest Regions*

See also *For. Abstr.* 12 (Nos. 936, 985, 1102).

912. MARSICO, G. Aspetti forestali della provincia di Cosenza. **[The forests of the province of Cosenza [, Calabria].]** *Ital. for. mont.* 5 (3), 1950 (104–10). [It.f.]

913. BUCHHOLZ, E. Die Forst- und Holzwirtschaft der Sowjet-Union nach dem Kriege. **[Forestry and wood utilization in the Soviet Union after the war.]** *Z. für Weltforstw.* 12 (1/3), 1948 (18–30). 19 refs. [G.e.f.]

914. [SOEST, J. VAN] De bosbouw in Nederland. **[Forestry in Holland.]** Nederlandsche Boschbouw Vereeniging. (Printed by Ponsen & Looijen, Wageningen.) 1950. pp. 49. 21 refs. [Du.]

A semi-popular descriptive booklet, prepared under the auspices of the Netherlands Forestry Society, giving a general review of forests and forestry (including road- and canal-side plantations) in Holland.

915. PAVARI, A. Foreste ed economia forestale della Berberia. **[Forests and forestry in Barbary.]** *Monti e Boschi* No. 5, 1950 (195–203). [It.]

Mainly a review of Boudy's work on the forests of North Africa. [Cf. *For. Abstr.* 10 (No. 2405).]

916. LACOURLY, G. Les forêts de Tunisie. **[The forests of Tunisia.]** *Rev. int. Prod. colon.* 25 (249/250), 1950 (129–30). [F.]

917. GIORDANO, G. Utilizzazione delle foreste dell'Etiopia. **[Exploitation of the forests of Abyssinia.]** *Riv. Agric. subtrop. trop., Firenze* 43 (1/3), 1949 (29–35). [It.it.e.] E.M.B.

A short account of the forests, and an assessment of the work necessary before they can be properly exploited.

918. KOTSCHWAR, A. Liberia und seine Wälder. **[Liberia and its forests.]** *Weltholzw.* 2 (5), 1950 (87–8). 13 refs. [G.] P.R.

919. KING, D. B., ROBERTS, E. V., and WINTERS, R. K. **Forest resources and industries of Missouri.** *Bull. Mo. agric. Exp. Sta.* No. 452, 1949. pp. 89 + 1 map.

1. FUNDAMENTAL NATURAL LAWS OF THE FOREST

11.2. *Climate and Microclimate*

See also *For. Abstr.* 12 (Nos. 983, 1000).

920. PAVARI, A. Foresta e deserto. **[Forest and desert.]** *Repr.* from *Scientia, Asso (Como)* Mar./Apr., 1950 (94–105). 26 refs. [It.]

Combats the doctrine that the Mediterranean basin is undergoing an increasing regression of vegetation (and especially of forest vegetation), under the direct influence of the Sahara. The author adduces evidence that the climate of the region is subject to an oscillation between dry and moist periods, and argues that the undoubted regression of vegetation is caused wholly by human activities.

11.4. *Soil*

See also *For. Abstr.* 12 (No. 983).

921. SAKHAROV, M. I. Vliyanie vetra na pochvu v lese. **[The influence of wind on the forest soil.]** *Pedology* 1949 (12), (734–8). 13 refs. [Russ.] A.P.B.

A discussion in general terms [with practically no quantitative data] of both direct effects (litter distribution, soil drying, and the blowing in of sand, soil particles etc.) and of indirect ones (e.g. admission of light by the disturbance of tree crowns, shaking off of snow and rain, contributions to litter through breakage of branches and the blowing off of leaves, flowers and fruits, effects on subordinate layers of vegetation, soil disturbance by windthrow).

11.41. Soil Physics

See also *For. Abstr.* 12 (Nos. 1638–9).

922. RENNIE, P. J. **Research into the physical and chemical properties of forest soils.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (71–5).

Deals mainly with the practical difficulties of finding satisfactory methods of determining pore space, air/water distribution and rate of infiltration of water.

923. NIKITIN, P. D., and BREDIKHINA, L. N. O kondensatsii vodyanýkh parov vozdukha v pochve lesnýkh nasazhdeni. **[Condensation of water vapour of the air in the soil of forest stands.]** *Pedology* 1949 (12), (723–33). 6 refs. [Russ.] A.P.B.

Gives details of the results of simultaneous measurements made in July 1947 at the Studentsý field station, Kuybýshev Province, in September 1947 at Mariupol, Stalin Prov., and in July 1948 in the Lenin Leskhoz, Rostov Prov., all in middle-aged and maturing stands dominated by Oak or Norway Maple, of (1) temperature and humidity at 5 cm. above ground, and soil temperatures at 5 and 10 cm. depth, and (2) moisture condensation within and evaporation from the soil. Figures for adjacent open steppe were obtained at the same time.

Measurements (1) showed the usual effects of tree cover in producing a more equable microclimate than that of open steppe, with higher air humidities throughout, lower air temperatures by day and higher ones by night, and lower soil temperatures throughout, i.e. conditions less favourable to evaporation and more favourable to thermal condensation within the forest soil.

For (2), litter or soil samples of intact structure were weighed in glass cylinders 7 cm. tall and replaced, still in their cylinders, in the soils from which they had been taken. Repeated weighings were then made at intervals, to determine moisture gains or losses by

condensation or evaporation. Results indicated that: (*a*) Soil moisture was much higher in the forest than in adjacent steppe (the respective moisture contents of the upper soil being 9·8 and 2·4% at the Studentsÿ station, 15·6 and 9·6% at Mariupol, and 24·9 and 17·9% in the Lenin Leskhoz). (*b*) In the open steppe, evaporation was the rule by day (soil moisture decreasing by *ca.* 0·5–1%), with some slight condensation by night (increases of *ca.* 0·1%). (*c*) In the forest the reverse was true, soil moisture increasing by day (increases of 0·03–0·16%) and decreasing by night (by 0·05–0·15% in summer and up to 0·24% in autumn). Owing to the temperature inversion in the soil, this increase due to condensation is in all probability continued downward through the soil beyond the 7 cm. for which the samples were taken. The daily condensation occurs when the vapour pressure of the air exceeds that in the soil, and this phenomenon appears to be frequent (7–9 days out of 10 in the summer and autumn). If extensive steppe afforestation is carried out it may therefore be expected that even light rains will be turned to account, owing to reduced evaporation and to saturation of the lowest air layers, with subsequent condensation of moisture in the soil.

924. MAŘAN, B., and LHOTA, O. Pohyb půdní vlhkosti v lese r. 1947. [**Soil moisture fluctuations in the forest, 1947.**] *Sborn. čsl. Akad. zeměd.* 22 (1), 1949 (25–32). 12 refs. [Cz.russ.e.] (Also in *Vestn. čsl. Akad. zeměd.* 23 (1/2), 1949 (45–51).) [Státní výzkumné ústavy lesnické, Prague.] C.G.B.

Tabulates and discusses results from studies of soil moisture in the Hetlin Forest, Czechoslovakia, in this drought year. For Aug.–Oct. only 25–15% of the normal precipitation fell, and soil moisture in the rooting zone dropped in many cases almost to 3% (10% of the normal value). Hardwoods suffered least, and their fallen leaves kept the soil shaded. Conifers, especially the shallow-rooted Norway Spruce, and young Larch that had not yet closed canopy and had a ground layer of grass, suffered most. Not merely individual trees, but whole stands died, especially those of the lower and middle age classes. Soil at the margin of stands was drier, and dried out faster and for a longer period, than that in the interior of stands. Damage was worst on shallow soils and 'physiologically shallow' soils, e.g. podzols with impermeable B horizons.

11.42. Soil Chemistry

See also *For. Abstr.* 12 (Nos. 931, 1113, 1639).

925. UGARTE LAISECA, J. Fitoquímica forestal. Tercera parte. [**Plant chemistry in the forest. Third part.**] [*Bol.*] *Inst. for. Invest. Exp. Madrid* 21 (52), 1950. pp. 146. [Span.span.g.e.f.]

A continuation of the studies already published [cf. *For. Abstr.* 11 (No. 1596)]. Part 3 contains a study of elements of 'Group C' (B, Br, Zn, Co, Cu, F, I, Ni, V) and of 'Group D' (Sb, A, As, Ba, Be, Bi, Cd, Ce, Cs, Zr, Cr, Sn, Sr, Ga, Ge, Li, Hg, Mo, Au, Ag, Pb, Rb, Se, Tl, Te, Ti, Th, Tu, U and W). Their presence in plants, the rôle they play in plant life, and the effects of excesses and deficiencies, are discussed. Summaries of the chemical content of soils maintaining the most important Spanish species (mainly *Pinus* and *Quercus* spp.) are also presented in tables and graphs and are discussed. The third part concludes with a preliminary study of the chemical nature of the forest floor and a brief discussion of ways of determining the silvicultural characters of species.

926. EISENMENGER, W. S. **Relative capacity of soils to furnish ions to plants.** *J. For.* 48 (6), 1950 (416–8).

Twigs of the latest annual growth of *Fraxinus americana*, *Betula lenta*, *Carya glabra*, *Quercus velutina* and *Rhus typhina*, and whole plants of *Andropogon scoparius* and *Solidago nemoralis*, were collected from four soil series derived respectively from (1) limestone, (2) traprock, (3) granite and (4) triassic sandstone, and analysed. The average percentage intake of both Ca and Mg was highest in the plants grown on series (2), followed by those grown on series (1). The lowest average percentage of Ca was found in the plants grown on series (3), and of Mg on series (4). The order of uptake of Ca and Mg did not correspond to the order of relative abundance of these elements in the parent rocks, nor to the order of exchangeable Ca, nor the order of base exchange capacity of the soils. It is suggested that the greater intake of Ca and Mg by plants on soils derived from traprock may be due to antagonism. *From author's summary.*

11.43. Biology of Soil, including Mycorrhiza

See also *For. Abstr.* 12 (No. 1121).

927. SHTERENBERG, P. M. Mikoriza drevesnoy rastitel'nosti v stepi. [**Mycorrhizae of woody vegetation in the steppe.**] *Agrobiologiya* 1949 (6), (149–52). [Russ.russ.] [Odesskaya Nauchno-Issledovatel'skaya Stantsiya Polevodstva, st. Výgoda.] A.P.B.

Roots of woody species grown in various localities in the Odessa region were examined in April/May and September. (1) Oak [*Q. robur*?], Pine [*Pinus sylvestris*?], and Spruce [*Picea abies*?] had mycorrhizae and no root hairs. (2) Lime [*Tilia cordata*?], *Betula pubescens*, *B. verrucosa*, *Populus nigra*, *P. nigra* var. *italica*, *Acer pseudoplatanus*, and *Ephedra* sp., had both mycorrhizae and root hairs. (3) *Robinia pseudoacacia*, *Caragana arborescens* and *Amorpha* [*fruticosa*?] showed root nodules and root hairs. (4) *Elaeagnus* [*angustifolia*?] had mycodomatia and root hairs. (5) No symbionts were found on *Acer campestre*, *A. tataricum*, *A. negundo*, *Prunus amygdalus*, *Mespilus germanica*, *Juglans regia*, *Fraxinus* [*excelsior*?], *Gleditsia* sp., *Ulmus* sp., and fruit trees in general. All these had well developed root hairs.

Well developed Oak mycorrhizae were found where soil pH values were 6·5–6·8 under the roots and 6·9–7 at a distance of 2 m. from them, which suggests that the low acidity of the local soils will not impede the development of mycorrhizae on this species.

In experimental sowings of Oak by the 'nest' method, the seed spots being inoculated with mycorrhizal soil, mycorrhizae began to develop in August, and at the end of September most of the seedlings had well developed mycorrhizae. Mycorrhiza was best developed on strong seedlings 20–23 cm. tall and with 18–20 leaves; seedlings without mycorrhiza were generally shorter and had fewer leaves, in some cases of an abnormally light colour. On one place, where the agricultural crop between Oak was pumpkin, rain in June caused the latter to grow rampantly; most of the Oak seedlings here came up under the shade of the pumpkin and had no mycorrhizae, were poorly developed, and appeared chlorotic. Abundant development of mycorrhizae occurs in the spring and autumn periods of active root growth since only young root tips become enveloped by the fungal hyphae, and as root growth is affected by assimilation products from the leaves, reduced assimilation by etiolated leaves will result in decreased root growth and decreased infection by mycorrhizal fungi. It is therefore urged that for intercropping in shelterbelt plantations special care should be taken to use agricultural plants that will not overshade the tree seedlings, and especially cereals that are not subject to laying.

928. HOUBA, A. Informativní methody k posouzení naléhavosti probírek v porostech borovice obecné podle stupně mikrobiálního rozkladu ústrojných látek lesní půdy. ['**Informative' methods for appraising the need for thinnings in Scots Pine stands according to the rate of microbiological decomposition of the organic matter of forest soils.**] *Sborn. čsl. Akad. zeměd.* 22 (1), 1949/50 (173–80). 26 refs. [Cz.russ.e.] C.G.B.

Preliminary experiments on the microbiological decomposition of soil organic matter in Scots Pine forests in S. Bohemia, using the Rossi/Cholodny and the Vinogradsky cellulose (filter-paper) decomposition tests as indexes to rate of decomposition [cf. *For. Abstr.* 10 (No. 1578)], showed that these tests will differentiate decomposition rates in soils under stands differing in density and site quality. It is therefore suggested that such tests should be a valuable aid in determining the appropriate silvicultural treatment, especially the need for thinnings.

929. THOM, C. **Action of soil bacteria on wood products.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 32, 1950 (33–40). P.R.

It is demonstrated, on the basis of Waksman's *Principles of Soil Microbiology* and of the author's and other investigators' experience, that: (1) Forest waste decomposes to make a good-quality humus; for this purpose a very moderate aeration is required below the top layer. (2) The various stages of decomposition cover (*a*) a quick decay of water-soluble carbohydrates and green plant protein, (*b*) a slow breakdown of the more stable celluloses, hemicelluloses, etc., both with evolution of great volumes of CO_2, and (*c*) blending of residues with residues of myriads of microbes to form humus. [Cf. *For. Abstr.* 12 (Nos. 1249–50).]

930. EASTWOOD, D. J., FRASER, G. K., and WEBLEY, D. M. **Microbiological factor in the Culbin sands afforestation scheme.** *Nature, Lond.* 165 (4207), 1950 (980–1).

A comparison was made of the number of micro-organisms: (1) in open sand (*a*) at a depth of ½–2 in., and (*b*) at 2–12 in.; and (2) under a 20-year-old stand of *Pinus nigra* (*a*) at 0–½ in., (*b*) ½–1 in., (*c*) 1–2 in. and (*d*) at 2–12 in. Data are tabulated. In the ½–2in. layer, the number of bacteria/g. oven-dried material was 22,510 in open sand and 11,498,900 under the Pine; corresponding figures for fungi were 62 and 3,177,968. The highest number of micro-organisms is found in the top 2 in. [Cf. *For. Abstr.* 11 (No. 2492).]

931. GAVRILOV, K. A. Vliyanie sostava lesonasazhdeni na mikrofloru i faunu lesnÿkh pochv. **[Influence of stand composition on the microflora and fauna of forest soils.]** *Pedology* 1950 (3), (129–41). [Russ.] [Moskovski Gosudarstvennÿ Universitet im. M. V. Lomonosova, Kafedra Pochvovedeniya.] A.P.B.

Gives details of comparative studies made in two experimental forests—that of the Timiryazev Academy of Agriculture [Moscow Province] and that at Trostyanetsk, Suma Province. These widely separated localities differ in climate, parent material of the soil, and soil type (thick turfy medium podzolic in the Timiryazev station; grey forest soil at Trostyanetsk). At each station four even-aged stands of uniform density, in close proximity, and differing only in specific composition, were selected for studies of quantitative and qualitative differences in soil flora and fauna—bacteria, microscopic fungi, actinomycetes, algae, protozoa, and the 'mesofauna' (worms, insects, larvae etc.)

Oak, Birch and Scots Pine stands were studied in both localities, the fourth stand being of mixed Siberian and European Larch in the Timiryazev station, and of Norway Spruce at Trostyanetsk. At the former station the stands were *ca.* 70 years old, and at the latter, 35–45.

Results, which are given in tables, showed that both quantitative and qualitative differences exist in the populations of soil organisms under the various tree species, and trends were the same at both stations. Soil organisms were most abundant, and most varied as to species, under Oak. Under Birch the soil fauna and flora were somewhat poorer, especially in specific composition but also quantitatively. The soils under the conifers, and especially under Spruce, were much poorer in both quantity and number of species of soil organisms.

Material differences were also found in soil properties under different tree species despite the fact that the soil type had been uniform within each locality. Thus soils under Oak, the richest in soil organisms, also proved richer in humus, N, and P, had a less acid reaction and a better structure, than soils under conifers. Such differences were most pronounced in the upper, humous horizon of the soil, where organisms were most abundant.

932. MURPHY, P. W. **Soil faunal investigations.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (67–71).

The early stages of this work were confined to devising satisfactory methods of extracting the organisms from the soil and to sampling some undisturbed *Calluna* heathland soils in Allerston Forest in N.E. Yorkshire, with a view to determining the best sampling technique. These soils were found to have large numbers of organisms in the litter and humus layers, e.g. 320 organisms in a litter sample having an air-dry weight of only 3·7 g., and 107 organisms in a humus-layer sample of about the same size. Mites (Acari) predominated, mainly of the group Orobatidae, while Collembola were the second commonest group. Larger organisms such as millipedes, spiders, and beetles, were relatively scarce. The method of extracting the organisms is a modification of the Berlese funnel technique, in which soil blocks are progressively desiccated by gentle heat from above, thereby driving the organisms out of the soil downwards into a funnel where they can be collected. The efficiency of this method in getting all or most of the organisms out of the soil still requires to be critically tested.

11.48-9. Soil Types

933. IVANOVA, E. N. Uchastie Pochvennogo Instituta im. V.V. Dokuchaeva v rabotakh po bor'be s zasukhoy i preobrazovaniyu prirodÿ lesostepnÿkh i stepnÿkh rayonov Evropeyskoy chasti SSSR. **[The role of the V.V. Dokuchaev Institute of Pedology in**

the work for drought control and the transformation of nature in the forest-steppe and steppe regions of Russia-in-Europe.] *Pedology* 1949 (12), (739–52). [Russ.] A.P.B.

Includes—as a guide for those making detailed field studies of the soils—a systematic list of the soil types to be found on the sites of the projected shelterbelts in S. Russia, with brief descriptions of their diagnostic characters and distribution, and notes on other characters used in classification, e.g. texture classes, and degree of salinity and alkalinity.

934. SHUMAKOV, V. S. K kharakteristike pochvennogo pokrova trassy gosudarstvennoy zashchitnoy lesnoy polosy Penza-Kamensk. [**Characteristics of the soils along the projected lines of the Penza-Kamensk State shelterbelt.**] *Pedology* 1949 (12), (702–16). [Russ.] A.P.B.

Tabulates and discusses the characteristics of the chief soils along the projected course of the shelterbelt, which is in the chernozem region.

Locally there is some alkalinity and salinity, but on the whole the soils are favourable for afforestation, provided that careful attention is paid to choice of species and site preparation, especially in areas that tend to be saline or alkaline, and to the trapping of as much snow-water as possible.

935. KALASHNIKOV, A. F., and ROMANOV, A. A. K voprosu agrolesomeliorativnoy otsenki temnokashtanovykh pochv. [**Evaluation of the suitability of the dark chestnut soils for shelterbelts.**] *Pedology* 1949 (12), (714–7). 3 refs. [Russ.russ.] A.P.B.

Gives the results from field studies of the soils, relief, and condition of some shelterbelts (tree-plus-shrub type, consisting of Oak, *Gleditsia* sp., Ash, *Robinia* etc., and planted in 1932–33) at a field station of VNIALMI in the Orlov district, Rostov Province. It is concluded that relief is the chief factor determining the suitability of the soils for shelterbelts, which are thrifty and healthy on gradual slopes, flattish ground and depressions—sites where the dark chestnut soils have a quite low degree of alkalinity and gypsum-bearing horizons occur at deeper levels (155 cm., or more, from the soil surface). On alkaline (solonets) varieties of dark chestnut soils, with gypseous horizons nearer to the surface, the plantations are poor or have failed, and radical soil improvement measures are required if they are to succeed.

936. O'BRIEN, R. E., and KOHLER, E. J. **Reconnaissance soil survey of Japan: Kyushu.** *Rep. nat. Resour. Sect., G.H.Q., S.C.A.P., Tokyo* No. 110–*B*, 1950. pp. 73 + 10 maps. 7 refs.

Of the 5 great soil groups to which the soil associations are allotted, forest growth is found chiefly on the lithosols and on the newly recognized 'Ando' soils, which are well drained, dark-coloured soils derived from wind-deposited volcanic ash. Analyses of representative associations are tabulated and the whole series mapped in colour on 10 sheets (scale 1 : 250,000). There is a brief description of the forest vegetation (pp. 15–18) and a short account of forest ownership, practice and products (pp. 62–3), supplemented by tables giving the forest area by broad forest types and by ownership, both in ha. and by prefectures.

937. KELLOGG, C. E., and DAVOL, F. D. **An exploratory study of soil groups in the Belgian Congo.** *Publ. Inst. nat. Étude agron. Congo Belge* (*Sér. sci.*). No. 46, 1949. pp. 74 + 35 photos. 20 refs. [E.e.]

Tentative suggestions are made for the nomenclature and definition of the principal great soil groups. The data on soil profiles show clearly the great influence of the forest in garnering mineral plant nutrients and concentrating them at the surface, and the inferior effectiveness of savanna grasses in this respect. The corridor system of shifting cultivation is explained briefly with examples. *From authors' summary.*

11.6. *Hydrographical Conditions. Water and Soil Conservation*

See also *For. Abstr.* 12 (Nos. 1104, 1109–10).

938. **Handbook [of methods for] preliminary examinations and surveys of watersheds for runoff and waterflow retardation and soil erosion prevention in the interest of flood control.** U.S. Dep. Agric. Jan., 1947. pp. 102.

939. GOODELL, B. C. **A trapezoidal flume for gaging mountain streams.** *Sta. Pap. Rocky Mt. For. Range Exp. Sta.* No. 2, 1950. pp. 18.

940. LULL, H. W., and ORR, H. K. **Induced snow drifting for water storage.** *J. For.* 48 (3), 1950 (179–81).

In view of the possibility of prolonging the snow-melting period by induced snow drifting, a study was made of drifts in the lee of Fir clumps on Wasatch Plateau, Utah. These clumps average 22 ft. in height, 60 ft. in length and 32 ft. in width, and contain 75–100 branchy trees. About 50% of the trees are less than 2 in. d.b.h., 25% are 2–4 in., 20% 4–8 in., and 5% 8–14 in. Drifts formed in the lee of Fir clumps are steep-walled and roughly triangular in shape. Ten drifts were measured immediately after the disappearance of snow from undrifted areas on 1 June 1947; average snow depth was found to be 3·8 ft. with average water depth 1·9 ft. The average length of the drifts was 70 ft.; width varied with the width of the barriers. These drifts lasted for 3–4 weeks, most of them disappearing by 25 June. In 1948, a warmer year, the drifts melted rather more rapidly. It is calculated that drifts containing about 2 ft. of water remain until *ca.* 400 day degrees above 32° F. have been accumulated. (Day degrees for each period is the sum of the average daily temperatures, expressed in degrees above 32° F.) Experiments were made with fences, 50 ft. long and either 7 or 11 ft. high. The 7-ft. fences were ineffective, but substantial drifts formed behind the 11-ft. fences; these, though only half as high as the average tree barriers, created a drift that contained about 70% as much water and lasted about 70% as long as those formed behind Fir clumps.

941. AYER, G. R. **A progress report on an investigation of the influence of reforestation on stream-flow in State forests in central New York.** U.S. Department of the Interior, Geological Survey. 1949. pp. 185 + 1 plate.

The third report on a co-operative project, initiated in 1932, to measure stream flow from 3 reforested areas in New York State, with a single control. Accumulated data of 15 years are presented. Up to date no significant change has been observed in run-off from reforested areas. Slight trends towards increased water loss have developed, and a similar trend in the ratio of annual run-off to rainfall, but these are not yet significant. The canopy of the conifer plantations established in the early 1930's has not yet closed, and it is recommended that the project should be prolonged for at least another 10 years.

12. FOREST BOTANY. TREE SPECIES

12.1. *General Botany*

12.11 Physiology. Reproduction. Growth

See also *For. Abstr.* 12 (No. 983).

12.11.1. *Plant Constituents. Metabolism. Photosynthesis. Translocation. Sap Flow. Transpiration. Growth Substances*

See also *For. Abstr.* 12 (Nos. 925–7, 1022, 1053, 1097, 1175 *et seq.*, 1456–8, 1467–8, 1470–3, 1477–89, 1496–7, 1501–2, 1507–16).

942. THOMAS, M. D., HENDRICKS, R. H., and HILL, G. R. **Sulphur content of vegetation.** *Soil Sci.* 70 (1), 1950 (9–18). 13 refs.

Leaves of a large number of plants (including trees) growing in the western part of the U.S.A. were analysed for S content. The results are presented. Total leaf S and sulphate content vary over a wide range, depending on the supply from the soil or the atmosphere. Organic S content shows a very narrow range in the leaves of many species, usually falling between 0·2 and 0·4% on the dry-weight basis. In needles of conifers, however, the amounts are smaller, usually about 0·1%. *From authors' summary.*

943. BHATTACHARYA, A., CHATTERJEE, A., and BOSE, P. K. **On an alkaloid of *Kopsia fruticosa*. I.** *J. Amer. chem. Soc.* 71 (10), 1949 (3370–2). 3 refs. (*Contribution from the University of Science and Technology, Calcutta, and the Gates and Crellin Laboratories, California Institute of Technology* No. 1280.) O.R.S.

944. HAUPTMANN, H., and NAZÁRIÔ, L. LACERDA. **Some constituents of the leaves of *Cassia alata* L.** *J. Amer. chem. Soc.* 72 (4), 1950 (1492–5). 16 refs. [University of São Paulo.] O.R.S.

945. ANCHEL, M. **Identity of a substance isolated from *Cassia reticulata***

Willdenow with that isolated from *Cassia alata* L. *J. Amer. chem. Soc.* 72 (4), 1950 (1832). 2 refs. [New York Botanical Garden.] O.R.S.

946. BADGER, G. M., COOK, J. W., and ONGLEY, P. A. **The chemistry of the *Mitragyna* genus. Part 1.** *Journal of the Chemical Society, London* March, 1950 (867–73). [University of Glasgow.] O.R.S.

Rotundifoline has been extracted from the leaves and rhyncophylline from the bark of *M. ciliata.* Mitragynol has been isolated from *M. rotundifolia* and the dextra-form of mitraphylline from *M. rubrostipulacea.* Quinovic acid has been isolated from leaves and bark of several species, and a sterol from the bark of *M. inermis* has been identified as β-sitosterol. *From authors' summary.*

947. SIMINOVITCH, D., and BRIGGS, D. R. **The chemistry of the living bark of the Black Locust tree in relation to frost hardiness: I. Seasonal variations in protein content. II. Seasonal variations in the electrophoresis patterns of the water-soluble proteins of the bark.** *Arch. Biochem.* 23 (1), 1949 (8–28). 11 + 5 refs. [University of Minnesota, St. Paul] O.R.S.

(I) The concentration of water-soluble proteins in the bark of *Robinia pseudoacacia* increases in autumn and decreases in spring. It is suggested that there exists some causal relationship between this constituent and the mechanism of the development of frost-hardiness. Reducing and non-reducing sugars decrease in spring, but the rate of decrease is more rapid than that of the decline of frost-hardiness in the tissues. When the crown is removed from a tree in winter, decline of frost-hardiness in the stump and the seasonal decrease in protein are delayed, whereas the reducing and non-reducing sugars decrease to a greater extent than in normal trees. The latter, therefore, do not appear to be primary factors in the mechanism of development of frost-hardiness.

(II) The extractable proteins consist of at least 5 major electrophoretically distinguishable components. There is no significant difference between the autumn and spring electrophoresis patterns and that characterizing the winter protein. In summer, however, there are relatively large shifts in the concentrations of 2 or 3 of the components relative to the other components of the total protein. When the crown of a tree is removed, the normal development of the electrophoresis pattern characteristic of the summer tissue proteins is retarded in the stump, while the progressive loss of frost hardiness and protein hydrolysis are inhibited. On the same day, electrophoresis patterns of proteins from trees growing in closely associated groups are identical. The patterns of proteins from more widely separated groups, however, are not identical, but differ in relative concentrations of the various components. *From authors' summaries.*

948. BOGORAD, L. **Factors associated with the synthesis of chlorophyll in the dark in seedlings of *Pinus jeffreyi.*** *Bot. Gaz.* 111 (3), 1950 (221–41). 23 refs. (*Contribution from Hull Botanical Laboratory* No. 611.) O.B.D.

Chlorophyll formation in the dark, and certain relationships between megagametophyte and sporophyte, were studied in germinating seeds and excised seedlings of *Pinus jeffreyi.* Some aspects of chlorophyll synthesis in light and darkness were also compared. The embryo sporophyte produced chlorophyll in the dark when in contact with the megagametophyte, but failed to do so when removed from it. The chlorophylls produced in the dark and in the light were spectroscopically similar. Seedlings separated from megagametophytes during the first few days after germination, continued to form chlorophyll in the dark, but for a limited time and at a slower rate. Seedlings separated from megagametophytes after 6 days in the dark and exposed to light during 2 days, synthesized chlorophyll about 4 times as rapidly as similar seedlings kept in the dark, but at about the same rate as seedlings remaining in contact with their megagametophytes in the dark. Increase in chlorophyll of the latter type of seedling follows the curves for increase in Mg and total dry weight. Seedlings excised from megagametophytes 6 days after germination in the dark and then grown on Loo's medium in the dark, increased in dry weight and total Mg content, but they synthesized chlorophyll at the same rate and in the same quantity as similar excised seedlings grown on a medium of washed agar and Pyrex-distilled water. Total ether-soluble Mg in seedlings grown in the dark in contact with their

megagametophytes, increased during germination, but more slowly than Mg incorporated in chlorophyll. The rate of chlorophyll synthesis and the maximum amount formed in the dark by seedlings separated from megagametophytes and grown in the dark, varies with the duration of contact of these two seed components during germination and preceding separation. The possibility that different, or fewer, steps in the synthesis of chlorophyll are photochemical in *P. jeffreyi* than have been described for etiolated angiosperm seedlings, is discussed. *From author's summary.*

12.11.2. *Reproduction. Propagation. Growth. Development*

See also *For. Abstr.* 12 (Nos. 1022, 1053–4, 1092, 1126, 1152–4).

949. CHANDRASEKHARAN, S. N., PARTHASARATHY, S. V., and SUNDARARAJ, D. D. **Sex in *Casuarina equisetifolia* Forst.** *Sci. & Cult.* 15 (4), 1949 (158–9). [Madras Herbarium, Agricultural College and Research Institute, Coimbatore.] L.S.

Examination of specimens from various parts of the Madras Presidency showed that both monoecious and dioecious types exist, but that they are rarely both common in the same locality.

950. KOWANICZ, W. Hodowla eukommii na tle zagadnienia przemiany płci u drzew dwudomowych. **[Cultivation of *Eucommia* and the problem of sex change in dioecious trees.]** *Las Polski* 23 (11/12), 1949 (26). [Pol.]

Summary of the explanation by the new Soviet (Michurin) school of biology, of the sporadic appearance of ♀ flowers on *Eucommia* trees that usually have ♂ flowers. Trees bearing ♀ flowers have been obtained by intense pruning. The Ministry of Forest Management of the U.S.S.R. were in 1949 undertaking tentative planting and sowing of *Eucommia* in forest stands in order to extend its northern limit of growth and to include it in forest stands as a supplementary economic species.

951. RAZI, B. A. **A contribution towards the study of the dispersal mechanisms in flowering plants of Mysore (South India).** *Ecology* 31 (2), 1950 (282–6). 2 refs. [Central College, Bangalore.]

952. DIJKMAN, M. J. **Rooting of Haden Mango (*Mangifera indica* L.) leaf-bud cuttings.** *Science* 111 (2894), 1950 (663–5). 45 refs. [University of Miami, Coral Gables, Fla.] O.R.S.

Leaf-bud cuttings were taken in June from the firm green part of wound shoots (a chip of wood remaining attached to the underside of the bud) and were treated with an indolebutyric-acid solution—5 sec. immersion in a solution of 10,000 p.p.m. in 50% methanol. The cuttings were then planted in propagating trays filled with sieved coconut-husk compost, and kept under a continuous water spray, where they had full morning sun and slight shade for the rest of the day. The temperature of the rooting medium seldom exceeded 27° C. After 6 weeks 75% of the treated cuttings had rooted or begun to root. [Cf. *For. Abstr.* 11 (No. 2524).]

953. VINCENT, G., and ŠPALEK, V. Standardní označení topolových sazenic a řízků. **[Standard designations for Poplar plants and cuttings [of different vegetatively propagated generations].]** *Sborn. čsl. Akad. zeměd.* 22 (2), 1949/50 (317–21). [Cz.russ.f.] [Státní výzkumný ustav pěstování lesů a lesnické biologie, Brno.] C.G.B.

Emphasizes the need for assuring that cuttings are taken from well developed, vigorous trees that have shown resistance to climatic agencies, insects and fungi. The author's experiments have shown that cuttings from 12-year-old or younger trees of *P. nigra* root more readily than those from older ones, e.g. cuttings from a 76-year-old tree gave 0·3% rooting and those from a 2-year-old tree, 96%. Rooting of stool shoots from a 100-year-old *P. nigra* var. *italica* gave a 1·5% strike. The same is said to be true of other Black Poplars. Cuttings should be taken from lignified shoots in the top of the crown. Since it is necessary to obtain stock in the first place from elite trees, it will nevertheless be necessary to take cuttings from older trees of proven value. These, designated by the letter *E*, should be used for stool beds to produce M_1, the first vegetatively propagated generation, which should again be used to form stool beds furnishing M_2, the second vegetatively propagated generation, for planting out. It is claimed that repeated vegetative propagation leads to degeneration, hence if the M_1 stools begin to produce poor

shoots, they should be discarded and replaced from a fresh élite stock (*E*).

Plants of unknown quality, or fresh strains imported from abroad, should be designated as *SE* until properly tested.

954. DABRAL, S. N. **A preliminary note on propagation of Bamboos from culm segments.** *Indian For.* 76 (7), 1950 (313–4 + 2 photos).

Experiments were made with *Bambusa arundinacea*, *B. polymorpha*, *B. tulda*, *Dendrocalamus longispathus*, *D. strictus* and *Thyrsostachys oliveri*. Culms 1–3 years old were cut with a sharp bill-hook, the slender tips were discarded and the remaining portion divided into 3-ft. segments by oblique strokes with a sharp, heavy bill-hook without splitting the culm wall. The cut was made just above a node that possessed a bud and complement of branches already developed with leaves, and the branches were trimmed to 3–4 in. Segments mostly contained *ca.* 3 nodes each. They were planted horizontally in trenches and covered at least 1 in. deep, the soil being well rammed. Planting was done in the 3rd week of June, and shade was provided against direct sun to protect against rapid evaporation of the soil. The most promising results were obtained with *D. longispathus*, *T. oliveri*, *B. tulda* and *B. polymorpha*; by July, sprouting from the nodes was noticed in most segments, and development continued until October. *B. arundinacea* did not sprout at all, and only very stunted growth occurred in *D. strictus*. A further experiment with *D. strictus*, planting at different seasons of the year, gave 20% sprouting for 1-year-old segments planted in February and 90% for those planted in April.

955. UZIELLO, A. Prove di innesto di sughere. **[Experimental grafting of Cork Oak.]** *Monti e Boschi* No. 5, 1950 (229). [It.]

Scions of 0·5 cm. diameter were successfully grafted in April on stocks of 6–12 cm. diam. cut off at 40–50 cm. from the ground.

956. WAREING, P. F. **Extension and radial growth in trees.** *Nature, Lond.* 166 (4215), 1950 (278). 9 refs. [Botany Dept., Bedford College, London.]

Three 10- to 12-year-old trees of Ash were decapitated on 3 April at 10 ft. above ground, and all branches and buds removed from the trunks. At this date there was no sign of renewal of secondary growth or of bud swelling. Observations on the cambium were made at intervals of 7–10 days by removing and sectioning small blocks from both decapitated and intact trees of comparable age. By 27 April a well developed ring of wide vessels had been formed in both sets of trees. Further secondary growth occurred in both series at an equal rate up to 15 May, but by the end of May the width of the new annual ring in the decapitated specimens was falling behind that of the normal trees. Thus in *Fraxinus excelsior* the initiation of cambial activity can occur in the trunks even in the absence of buds. In a further experiment, the buds were removed individually from 3- to 4-year-old trees of Ash on 30 May, but the twigs themselves were allowed to remain. In these trees, wide-vessel formation afterwards occurred throughout the plant. Similar results were obtained with 7-year-old de-budded trees of *Quercus robur*. In comparable experiments with the diffuse-porous types, *Acer pseudoplatanus* and *Tilia europaea*, however, no signs of cambial activity were obtained in decapitated or de-budded trees. The results seem to indicate a fundamental difference between ring-porous and diffuse-porous types of temperate regions with regard to the initiation of cambial activity, which is apparently dependent upon extension growth in the latter, but not in the trunks of ring-porous trees. [Cf. *For. Abstr.* 12 (No. 243).]

957. WHALLEY, B. E. **Increase in girth of the cambium in *Thuja occidentalis*** *Canad. J. Res.* 28*C* (3), 1950 (331–40). 9 refs. P.R.

Discusses the available experimental material, which indicates that girth increase of the cambium is accomplished not by regulated divisions spaced merely to bring about the required increase in circumference, but by such rapid multiplication of initials as to produce a great superfluity if all survive. Owing to the rapid production of new initials and the high ratio of disappearance, the pattern of cells in the cambium changes quickly. This necessitates extensive intercellular adjustments which seem to be completed rapidly. No support is found for Priestley's theory that cell adjustments in the cambium are gradual and of a 'symplastic' nature. *From author's abstract.*

958. ROUSSEL, L. L'épicéa du Haut Doubs et l'été de 1949. [**Spruce in the Haut Doubs and the summer of 1949.**] *Bull. Soc. for. Franche-Comté* 25 (14), 1950 (590–4). [F.]

During the summer (April-Sept.) of 1949, rainfall was 50% deficient and hours of sunshine 27% in excess of the average. Measurement of annual shoots of Spruce (10–20 years old) and comparison with similar data for the previous year, showed that growth in 1949 was significantly less for open-grown trees or trees growing in open stands or on forest edges (relative illumination 20–40%), but significantly greater for trees growing in dense stands (relative illumination 5–20%). The author discusses these results and concludes that the amount of growth is regulated by a combination of several factors, e.g. sunlight and precipitation, and that an increase in one factor alone will not increase growth unless accompanied by a corresponding increase in the others. Trees growing under dense cover did not receive the whole excess of insolation, and their 'ration' of light and water, was therefore better balanced. [Cf. *For. Abstr.* 11 (No. 838).]

12.11.3. *Heredity. Breeding. Hybridization. Races and Questions of Provenance. Cytology*

959. CAMPO-DUPLAN, [M.] VAN, and GAUSSEN, H. Sur quatre hybrides de genres chez les Abietinées. [**Four intergeneric hybrids among the Abietineae.**] *Trav. Lab. for. Toulouse* 1 (4) Art. 24, 1948. pp. 14 + 2 dgms. 1 ref. [F.] *Repr.* from *Bulletin de la Société d' Histoire Naturelle de Toulouse* 83, 1948.

Pollen of three species of *Tsuga* (*T. longibracteata* Cheng, *T. hookeriana* Murr. [= *T. mertensiana* (Bong.) Carr.], and *T. crassifolia* Flous [usually considered a Californian variety of *T. hookeriana*]) was studied and it was concluded from morphological differences that these must be intergeneric hybrids and not true *Tsugas*. Comparative study of their general morphology and geographical distribution, leads the authors to conclude that:—(1) *T. longibracteata*, found only in a restricted area in China, is a hybrid of *T. chinensis* with *Keteleeria evelyniana*, for which they propose the name *Tsugo-Keteleeria longibracteata*. (2) *T. hookeriana*, found in British Columbia and Washington, is a hybrid of *T. heterophylla* with *Picea sitchensis*, for which they propose the name *Tsugo-Picea hookeriana*. (3) *T. crassifolia* is a hybrid of (2) with *Picea engelmanni*, for which they propose the name *Tsugo-Piceo-Picea crassifolia*. (4) *T. jeffreyi* (a hybrid between (2) and *T. heterophylla*) must consequently be re-named *Tsugo-Piceo-Tsuga jeffreyi*.

The genetic and phyletic aspects of these hybrids are discussed. [Cf. *For. Abstr.* 12 (Nos. 978–81).]

960. MATTHEWS, J. D. **Genetics.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (26–9)

A striking variation has been found in Beech in a young Beech/Larch plantation mixture on a rather frosty chalk downland in Hampshire. At one extreme were trees with rather narrow leaves, short and sharply ascending branches, and very straight, persistent leaders. These individuals were making very fast growth and were well above the frost zone. At the other extreme were trees with wider leaves, longer and more spreading branches, no persistent leader and poor, coarse form. These individuals appeared to have been regularly frosted.

Individuals of Sitka Spruce have been found in several localities, which appear to be able to throw off attack by *Neomyzaphis abietina*. These have leaves with very blunt and shouldered apices and a very heavy construction. The leaf section is flat, the twigs are quite glabrous and individuals of this type can often be spotted in a plantation by their dense, compact crowns, dense and flattened leaf arrangement, bluish leaf coloration and, where *Neomyzaphis* is prevalent, by a sharp contrast in the intensity of infestation. The possibility of these trees' being of hybrid origin is being followed up. Some notes are given on methods of grafting.

961. MILLER, J. M. **Resistance of Pine hybrids to the Pine reproduction weevil** *For. Res. Notes Calif. For. Range Exp. Sta.* No 68, 1950. pp. 17.

The resistance of 21 species, strains, and hybrids to attack by *Cylindrocopturus eaton* was studied, by observation both of natural endemic infestation by the weevil, and of individual nursery trees enclosed in cages and exposed to mass attacks. *Pinus coulteri* was the most resistant of all the species tested; i

was not attacked by the weevil outside the cages, and inside the cages no trees were killed. *P. ponderosa* and *P. jeffreyi* were generally susceptible, but wide variation was shown by individual trees. *P. coulteri* × *P. jeffreyi* was not killed by attacks in cages; outside the cages some trees were attacked, but all resisted successfully. The resistance of the hybrid is comparable with that of *P. coulteri*. Susceptible species are *P. ponderosa* var. *scopulorum*, *P. banksiana*, *P. washoensis*, *P. contorta* var. *murrayana* × *P. banksiana*, *P. ponderosa* × *P. ponderosa* var. *scopulorum*, *P. ponderosa* × *P. apacheca*, and *P. ponderosa* × *P. arizonica*. *P. lambertiana* and *P. torreyana* were attacked in the cages, but no larvae completed their development. In some species resistance was not stable and varied considerably during the 3 years of the test; *P. coulteri* and *P. coulteri* × *P. jeffreyi* were resistant throughout the period. The development of the attack within the tree and the tree's growth reaction are illustrated by photographs and discussed. [Cf. *For. Abstr.* 9 (No. 1905).]

962. FRONTERA MARQUÉS, B. Práctica de la polinización artificial en los pinos. [**Artificial pollination methods applied to Pines.**] *Montes, Madrid* 6 (32), 1950 (166–74). [Span.]

Methods used at the Institute of Forest Genetics, Placerville, Calif.

963. WOOD, R. F. **Provenance studies.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (50–6).

Interim results of provenance trials with European and Japanese Larch, Norway and Sitka Spruce, and Scots and Lodgepole Pine.

964. VLOTEN, H. VAN. De zorg voor goed zaad van groveden beschouwd naar aanleiding van een herkomst-proef. [**Providing for good seed of Scots Pine considered on the basis of a provenance experiment.**] *Ned. Boschb.-Tijdschr.* 21 (1), 1949 (1–5). [Du.e.]

Results of measurements on 21-year-old trees, of different provenance, showing average diameter, height and volume, are given in graphs and tables. They reveal great differences in growth among trees of different provenance, Dutch as well as foreign. Some imported strains were equal in quality to the better home-grown strains and may be useful for selection and tree-breeding purposes.

965. AUGHANBAUGH, J. E. **Shortleaf Pine in Southern Pennsylvania.** *Pa. For. Wat.* 2 (4), 1950 (82–5, 93).

Gives a brief account of the silvicultural characters (including phenology) of *Pinus echinata*, which is near the northern limit of its range in S.E. Pennsylvania. Data are given for a provenance trial of seed from 6 sources: that from Morgan County, Tennessee, did better than that from lower latitudes and altitudes, but worse than that from Pennsylvanian sources. Figures are given for growth of two natural volunteer stands, 37 and 69 years old respectively.

966. MINCKLER, L. S. **Effect of seed source on height growth of Pine seedlings.** *J. For.* 48 (6), 1950 (430–1).

Pinus echinata and *P. taeda* from 6 geographical sources are being tested to determine their adaptability to the climate and soil of S. Illinois. At the end of the first year after planting, trees of both species showed highly significant differences in height, depending upon the seed source. *P. echinata* trees from some sources were taller than *P. taeda* from the same sources, though the latter is characteristically a faster grower.

967. **Geographic source of Loblolly Pine seed.** *Rep. Sth. For. Exp. Sta. 1949*, 1950 (2).

Measurement of *Pinus taeda* plantations at Bogalusa, Louisiana, showed that trees raised from local seed yielded 2½ times as much pulpwood at 22 years as trees from an Arkansas seed source. Seed from Texas and Georgia was little better than that from Arkansas, and trees of Georgian provenance appeared to be particularly susceptible to fusiform rust in Louisiana.

968. MUKHERJEE, S. K. **Mango: its allopolyploid nature.** *Nature, Lond.* 166 (4213), 1950 (196–7). 6 refs. [Botany Department, University, Delhi.]

The three species investigated (*Mangifera indica*, *M. sylvatica*, and *M. caloneura*) show striking stability in their chromosome numbers, all having $n = 20$ and $2n = 40$ chromosomes. The high chromosome number, correspondingly high number of nucleolar chromosomes, secondary association, regular pairing and disjunction of bivalents, absence of multivalent formation, and good fertility, establish the

allopolyploid origin of the Mangoes and allied species.

969. POUCQUES, M. L. DE. Études caryologiques sur les Fagales. I. Le genre *Alnus*. [**Studies of cell nuclei in the Fagales. I. The genus *Alnus*.**] *Bulletin du Muséum National d'Histoire Naturelle, Paris* (*Ser.* 2). 21, 1949 (147–52). 4 refs. [F.] L.S.

970. JOHNSSON, H. **On the C_0 and C_1 generations in *Alnus glutinosa*.** *Hereditas, Lund* 36 (2), 1950 (205–19). 17 refs. [Forest Tree Breeding Institute, Ekebo.] O.R.S.

C_0 trees derived from germinating seeds of *Alnus glutinosa* which had been colchicine-treated in 1941, were examined in connexion with flowering in 1948 and the development of flower buds in 1949. It was found that the trees are periclinal chimaeras with diploid epidermis and tetraploid underlying tissues, or with tetraploid epidermis and wood cells and diploid intervening tissues. The trees have retained their chromosomal constitution during the 8 years of the investigation. Four of the five trees studied produce diploid gametes. Their meiosis is normal for autotetraploids with a varying number of quadrivalents. A one-year-old C_1 offspring from a $C_0 \times$ diploid cross, is described. This is characterized by powerful growth and large leaves. The curve of variation for the population is skew and the range of variation is wider than in the diploid control. The dry-matter content of the wood is lower in the triploid than in the control and the specific weight of the wood in a dry state is lower. The variation range of autopolyploids in comparison with their diploid prototypes is discussed. *Author's summary.*

971. BERGER, C. A., and WITKUS, E. R. **Naturally occurring polyploidy in the development of *Albizzia julibrissin* Durazz.** *Bot. Gaz.* 111 (3), 1950 (312–3). 3 refs. [Fordham University, New York.] O.B.D.

Notes on polyploid mitoses found in root tips of young seedlings ranging from 2 to 30 mm in length.

12.13. Embryology

972. SPURR, A. H. **Organization of the procambium and development of the secretory cells in the embryo of *Pinus strobus* L.** *Amer. J. Bot.* 37 (3), 1950 (185–97). 49 refs. [University of California, Davis.] O.B.D.

973. WANG, F. H. **Observations on the embryogeny of *Podocarpus nagi*.** *Bot. Bull. Acad. sinica* 3 (4), 1949 (141–5). 10 refs

974. WALKER, R. I. **Megasporogenesis and development of megagametophyte in *Ulmus*.** *Amer. J. Bot.* 37 (1), 1950 (47–52). 11 refs. [University of Wisconsin, Milwaukee.] O.B.D.

12.14. Organography. Morphology. Anatomy. Histology

See also *For. Abstr.* 12
(Nos. 1015–6, 1020, 1028–9, 1145 *et seq.*)

975. ADDOMS, R. M. **Notes on the structure of elongating Pine roots.** *Amer. J. Bot.* 37 (3), 1950 (208–11). 10 refs. [Duke University, Durham, N.C.] O.B.D.

Rapidly elongating roots of *Pinus taeda* were studied. Sloughing of the epidermis occurs in strips producing a ragged appearance. Root tips may be pointed or become covered with investing tissue which imparts a blunt appearance. It is suggested that very rapid elongation and high resistance in the soil result in pointed tips, whereas less rapid elongation and lower resistance result in blunt tips. 'Secondary root hairs often occur on suberized portions of the root that have lost their epidermis. Lenticels occur singly at the base of most branch roots. Roots are usually di-arch with a primary resin duct in the fork of the Y-shaped protoxylem. *From author's summary.*

976. FOSTER, A. S. **Morphology and venation of the leaf in *Quina acutangula* Ducke.** *Amer. J. Bot.* 37 (2), 1950 (159–71). 30 refs. [University of California, Berkeley.] O.B.D.

977. GOMES, L. G. DE SOUZA. Estudo histológico e anatômico dos bulbos foliares de algumas Leguminosas. [**Histological and anatomical study of the pulvini of some Leguminosae.**] *Rodriguésia* 21/2, (22/3) 1948/9 (7–26). [Port.]

Mimosa pudica, M. velloziana, M. sepiaria and *Calliandra tweedii.*

978. CAMPO-DUPLAN, M. VAN. Étude de quelques grains de pollen sans ballonnets des

Abiétinées. **[Study of some pollen grains without air sacs, belonging to the Abietineae.]** *Trav. Lab. for. Toulouse* 1 (4) Art. 16, [1947?]. pp. 8. 4 refs. [F.]

Deals with pollen of *Tsuga canadensis*, *Larix decidua* and *Pseudotsuga taxifolia*.

979. CAMPO-DUPLAN, M. VAN. Notes sur la disparition des ballonnets chez les grains de pollen des Abiétinées. **[Notes on the disappearance of the air sacs from the pollen grains of the Abietineae.]** *Trav. Lab. for. Toulouse* 1 (4) Art. 17, [1947?]. pp. 6. 3 refs. [F.]

980. CAMPO-DUPLAN, M. VAN. Considérations biométriques sur les grains de pollen des Abiétinées. **[Biometrical observations on the pollen grains of the Abietineae.]** *Trav. Lab. for. Toulouse* 1 (4) Art. 18, [1947?], pp. 8. 10 refs. [F.]

981. CAMPO-DUPLAN, M. VAN. Notes sur le pollen des hybrides chez les Abiétinées. **[Notes on the pollen of hybrids among the Abietineae.]** *Trav. Lab. for. Toulouse* 1 (4) Art. 22, [1948?]. pp. 4. 2 refs. [F.]

Cf. *For. Abstr.* 12 (No. 959).

982. CAMPO-DUPLAN, M. VAN. Considérations générales sur l'évolution des grains de pollen. **[General considerations on the evolution of pollen grains.]** *Trav. Lab. for. Toulouse* 1 (4), Art. 23, [1948?]. pp. 8. 5 refs. [F.]

12.19. Geographical Distribution. Plant Geography and Sociology

See also *For. Abstr.* 12
(Nos. 1026, 1038, 1040–1, 1044, 1065).

983. LUNDEGÅRDH, H. Klima und Boden in ihrer Wirkung auf das Pflanzenleben. **[The influence of climate and soil upon plant life.]** Gustav Fischer, Jena. 3rd ed. (rev.) 1949. pp. viii + 484 + 2 maps. Copious refs. [G.] Price *DM*27 [£2. 9*s*. 6*d*.]

984. BROWN, J. M. B. **Forest ecology.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (30–3).

Mainly a summary of preliminary results of an ecological survey of Beech in Great Britain. The data so far obtained point to a rather slower growth of Beech in the Chilterns than on the South Downs or the Cotswolds. Within the range of Beech in Britain it seems that soil is of more importance than climate or topography, the most significant soil factors being depth, texture, the drainage profile, and carbonate content or base status. On fertile, calcareous loam over chalk in the Chilterns the distribution of Beech roots indicated that 18 in. was more than adequate for full development, while 12 in. or less was restrictive. Observations on many sites suggested that young Beech trees respond best when full overhead light is tempered by some side shade.

985. MALANDRINO, N. Il faggio in Provincia di Salerno. **[The Beech in the province of Salerno.]** Vincenzo Serafino, Cosenza. 1947. pp. 52. 11 refs. [It.]

Contains the following chapters:—General account of the province; meteorological data; forest zones; distribution and silvicultural requirements of Beech in Italy; distribution of Beech in the province of Salerno; flora associated with Beech; management and silvicultural treatment; logging and transport; the timber and its uses.

986. PARROT, A.-G. L'if dans les forêts du Pays basque. **[Yew in the Pays Basque forests.]** *Trav. Lab. for. Toulouse* 1 (4) Art. 27, 1948. pp. 4. 8 refs. [F.] *Repr.* from *Bulletin de la Société d'Histoire Naturelle de Toulouse* 83, 1948.

The comparative rarity of *Taxus baccata* in this region is due to past over-exploitation.

987. ZAHARI, M. **Ecological and sylvicultural notes on the forest trees in Israel.** *Forest, Palestine* No. 2, 1950 (1–7, *Suppl.* 1). [Heb.e.]

Notes on the main species, their characteristics and distribution in Israel and outside, and their chief uses, along with specific recommendations for where they could best grow. *Quercus calliprinos*, *Q. ithaburensis*, and *Cupressus sempervirens*, are dealt with at some length.

988. BOUVAREL, P. Les principales essences forestières du Liban. **[The principal forest species of Lebanon.]** *Rev. for. franç.* No. 6, 1950 (323–32 + 6 photos). [F.]

Ecological notes on *Cedrus libani*, *Abies cilicica*, *Pinus brutia*, *P. pinea*, *Juniperus* spp., and *Quercus* spp.

989. PURI, G. S. **The distribution of conifers in the Kulu Himalayas with special relation to geology.** *Indian For.* 76 (4), 1950 (144–53 + 12 photos). 26 refs.

From studies made in the Kulu Himalayas it is clear that lithology and structure of the main rocks are important factors in governing the growth and distribution of forest vegetation. Exacting communities with high foliar ash and CaO usually occur on the dip slopes. The scarp slopes are either bare of tree vegetation, or carry non-exacting species, with low amounts of foliar ash and CaO. At lower altitudes on quartzite formation or on flood-plain deposits, Chir Pine (*Pinus longifolia*) is almost always the earliest colonizer. The succession usually proceeds from Chir Pine → *P. excelsa* → *Cedrus deodara*. At higher elevations, *P. excelsa* is usually the pioneer, and succession proceeds from *P. excelsa* → *Picea smithiana*/*Abies webbiana* → *Abies webbiana*. The ecological relationship of plant communities with their habitat clearly shows that for planting *C. deodara* the most suitable sites are flood-plain deposits or dip slopes of phyllite. Quartzite formations or scarp slopes of schists and phyllites are unsuitable for this species but would suit *Pinus longifolia* or *P. excelsa*.

990. CHEVALIER, A. Répartition géographique et exploitation des palmiers *Borassus*. [**Geographic distribution and exploitation of the *Borassus* palms.**] *Rev. int. Bot. appl. Agric. trop.* 29 (325/6), 1949 (585–92). [F.f.] P.R.

Cf. *For. Abstr.* 12 (No. 1040).

12.19.1. *Regional Floras, including Check Lists*

See also *For. Abstr.* 12 (No. 1009).

991. P'EI, C. **The forest trees of north-eastern China. I.** *Bot. Bull. Acad. sinica* 3 (4), 1949 (160–78).

Notes on the important features of each species with an analytical key to each genus.

992. HILDEBRAND, F. H. Lijst van boomsoorten. [**A list of tree species.**] *Rapp. Bosbouwproefsta., Buitenzorg* Nos. 3, 5, 8, 9, 11, 19, 20, 22, 26, 29, 32. 1949–50. [Du.E.Jav.] (*Serie Boomnamenlijsten* Nos. 12–23).

Lists of species collected in different regions of Indonesia, arranged (1) by vernacular names and (2) by family, genus and species. Some variants of the vernacular names are also listed. [Cf. *For. Abstr.* 12 (No. 899).]

12.19.2-3. *Vegetation Types*

See also *For. Abstr.* 12 (Nos. 1065, 1655).

993. KÜCHLER, A. W. **A physiognomic classification of vegetation.** *Repr.* from *Annals of the Association of American Geographers, Lancaster, Pa.* 39 (3), 1949 (201–10). 16 refs.

A revised version of the author's system of legends for representing vegetation types on maps. [Cf. *For. Abstr.* 10 (No. 2483).]

994. KÜCHLER, A. W. Die physiognomische Kartierung der Vegetation. [**The physiognomic mapping of vegetation.**] *Repr.* from *Petermanns Geographische Mitteilungen, Gotha* No. 1, 1950. pp. 6 + 2 maps. 29 refs. [G.]

An exposition of the author's system for representing vegetation types on maps by compendious legends [cf. *For. Abstr.* 10 (No. 2483)], illustrated by two actual maps.

995. MOLINIER, R., and TALLON, G. La végétation de la Crau (Basse-Provence). [**The vegetation of the Plaine de la Crau (Basse-Provence).**] *Rev. gén. Bot.* 56 (670), 1949 (525–40); 57 (671–5), 1950 (48–61; 97–127; 177–92; 235–51; 300–18 + 1 map). 40 refs. [F.] O.B.D.

996. MATHON, C.-C. Contribution à l'étude phytogéographique de la Haute Provence occidentale. Note préliminaire à propos de la hêtraie du sous-étage inférieur du hêtre. [**Contribution to the study of the plant geography of eastern Haute-Provence. Preliminary note on the Beech stands of the lower levels of the Beech belt.**] *Bull. Soc. bot. France* 96 (7/9), 1949 (200–2). [F.] O.B.D.

997. MATHON, C.-C. Contribution à l'étude phytogéographique de la Haute Provence occidentale. (Note préliminaire sur les landes pierreuses neutro-basicoles de l'étage du chêne vert.) [**Contribution to the study of the plant geography of eastern Haute-Provence. (Preliminary note on the stony, neutral to basic heathlands of the *Quercus ilex* belt).**] *Bull. Soc. bot. France* 96 (7/9), 1949 (225–7). [F.] O.B.D.

998. BANTI, G. Su una formazione di ontano alpino delle alpi insubriche. [**A formation of Alpine Alder in the Alps near Milan.**] *Ital. for. mont.* 5 (2), 1950 (72–6). 5 refs. [It.f.]

Describes a formation of *Alnus minor* [? = *A. viridis*] associated with *Carex muricata*, which is invading degraded Beech woods.

999. KADAMBI, K. **Evergreen montane forests of the Western Ghats of Hassan District, Mysore state. A contribution to the ecology, plant geography and silviculture of the Western Ghat forests of Mysore.** *Indian For.* 76 (1; 2), 1950 (18–30; 121–32 + 2 photos, 3 gphs.).

1000. THOMAS, R. Essai de classement des formations congolaises à végétation arborescente d'après le groupement de leurs indices mensuels d'aridité. [**An attempt to classify the forest types of the Congo according to the grouping of their monthly indices of aridity.**] *Bull. agric. Congo belge* 41 (2), 1950 (373–97). 22 refs. [F.flem.]

This study is based on meteorological data collected at 87 stations in the Belgian Congo. The factors taken into account for each region are:—altitude; mean annual temperature; mean annual rainfall; annual index of aridity

$$\frac{P^a}{T^a + 10}$$

(where P^a = mean annual rainfall in mm., and T^a = mean annual temperature in degrees C.); mean of monthly indices (monthly index =

$$\frac{12\ P^m}{T^m + 10}$$

where Pm = mean rainfall for the month in question and T^m its mean temperature); maximum and minimum monthly indices; number of months with index < 20, 20–40, and > 40, respectively. The forest types of each region are discussed in the light of these data. It is concluded that in the Belgian Congo (and probably in other tropical regions), the eco-climate is the preponderating factor which governs the initial, general distribution of forest vegetation. The index of aridity could probably be used to distinguish climax savanna from savanna due to biotic interference, and thus to indicate those areas that can be usefully treated by afforestation, fire exclusion etc. The same criterion could be applied to determine regions where shifting cultivation with forest fallow can safely be practised; this, it is suggested, should not be allowed where the annual index of aridity does not exceed 40, or better still, does not reach 45. It is further suggested that the aridity factor should be indicated in statistics purporting to show proportion of forest areas in different countries, which at present often make no distinction between e.g. the thornbush of Bechuanaland and the tropical forest of Gabon (recently published statistics gave the forest area % for the two territories as 97 and 75% respectively).

1001. BLOOMBERG, W. J. **Fire and Spruce.** *For. Chron.* 26 (2), 1950 (157–61).

Analyses the composition and history of the mature Spruce/Balsam Fir association of south-western Alberta, and discusses the probable part played by fire in the original establishment of such an association.

1002. POLUNIN, N. *et al.* **Woodland quadrats on Montreal Island in the St. Lawrence River.** *J. Ecol.* 38 (1), 1950 (36–45 + 6 photos). 6 refs.

The quadrats are situated in (1) a *Fagetum*, (2) an *Aceretum sacchari*, and (3) a *Pinetum strobi—Tsugosum*. Each community is described and briefly discussed, the plant constitutents of the component layers being listed.

1003. HUSTICH, I. **On the forest geography of the Labrador Peninsula. A preliminary synthesis.** *Acta geographica, Helsinki* 10 (2), 1949 (1–63). 100 refs. [E.e.]

Includes chapters on: the phytogeography of the Peninsula in general (10 pp.); tree lines (20 pp.); principal forest types (13 pp.); the phytogeographical regions (6 pp.); the forest reserves (4 pp.).

1004. MIRANDA, F., and SHARP, A. J. **Characteristics of the vegetation in certain temperate regions of eastern Mexico.** *Ecology* 31 (3), 1950 (313–33). 10 refs.

The most important plant communities are described, and include the following forest types:—mixed Oak, pure Oak, *Liquidambar*, Pine (*Pinus patula* and *P. pseudostrobus*), Sycamore (*Platanus linderiana*), Beech (*Fagus mexicana*), *Weinmannia pinnata*, *Engelhardtia*, and 'barranca' forest which occurs in deep

barrancas or gorges. Some communities which follow forest destruction are also described briefly.

1005. STEARNS, F. **The composition of a remnant of White Pine forest in the Lake States.** *Ecology* 31 (2), 1950 (290–2).

1006. POTZGER, J. E. **Forest types in the Versailles State Park area, Indiana.** *Amer. Midl. Nat.* 43 (3), 1950 (729–41). 10 refs. [Butler University, Indianapolis, Indiana.]

1007. MUNZ, P. A., and KECK, D. D. **California plant communities.** *El Aliso* 2 (1), 1949 (87–105). 39 refs. [Carnegie Institution of Washington, Stanford, Calif.] L.S.
A preliminary classification.

12.2. *Special (Systematic) Botany*

See also *For. Abstr.* 12 (Nos. 897–900, 991–2).

1008. LANJOUW, J. [Editor]. **Botanical nomenclature and taxonomy. A symposium organized by the International Union of Biological Sciences with support of UNESCO at Utrecht, the Netherlands, June 14–19, 1948.** *Chron. bot.* 12 (1/2), 1950 (1–87).
Contains a supplement to the International Rules of Botanical Nomenclature, embodying the alterations made at the Sixth International Botanical Congress, Amsterdam, 1935.

12.25. Gymnosperms

See also *For. Abstr.* 12 (No. 959).

1009. OCCHIONI, P. Catálogo dos gimnospermos da flora do Brasil. [**Catalogue of the gymnosperms of the Brazilian flora.**] *Rodriguésia* 21/2 (22/3), 1948/9 (121–31). [Port.]

1010. MARTINEZ, M. No existe el *Cupressus thurifera* H.B.K. en México. [***C. thurifera* does not exist in Mexico.**] *Bol. Direcc. for. Caza, Méx.* Jan./Dec., 1949 (1–2). [Span.]
C. thurifera, described by Humboldt, Bonpland and Kunth in 1817, proved by the author's researches to be *Juniperus flaccida* var. *poblana*.

1011. BORDÈRES-REY, O., and GAUSSEN, H. Trois espèces nouvelles de sapins chinois: *Abies ferreana, A. minensis, A. salouenensis.* [**Three new Chinese species of Fir.**] *Trav. Lab. for. Toulouse* 1 (4) Art. 15, [1947?]. pp. 10. [F.]

1012. BULARD, C. Additions et corrections à l'étude du genre Picea. 1. *P. sikangensis* Cheng. [**Additions and corrections to the study of the genus *Picea*. 1. *P. sikangensis*.**] *Trav. Lab. for. Toulouse* 2 (3) Art. 2, 1946. pp. 6. 4 refs. [F.]

1013. BULARD, C. Quatre épicéas de la Chine centrale: *P. ascendens, P. brachytyla, P. complanata, P. sargentiana.* [**Four species of Spruce from central China.**] *Trav. Lab. for. Toulouse* 1 (4), Art. 20, [1947?]. pp. 10. 5 refs. [F.]
From considerations of their distribution, the author decides that these four Spruces are separate, though closely related, species.

1014. ANZILOTTI, F. Il pino laricio silano. [***Pinus nigra* var. *calabrica*.**] *Monti e Boschi* No. 3, 1950 (107–16). [It.]
Taxonomy, silvicultural characters, and utilization.

1015. MARTINEZ, M. Las Pseudotsugas de México. [**The Mexican species of *Pseudotsuga*.**] *An. Inst. Biol. Univ. Méx.* 20 (1/2), 1949 (129–84). C.G.B.
Detailed morphological and anatomical descriptions and taxonomy of the Mexican species.

1016. HO, C.-C. **Leaf anatomy of Chinese species of *Podocarpus*.** *Bot. Bull. Acad. sinica* 3 (4), 1949 (146–50). 8 refs.
Presents a key for the identification of Chinese species of *Podocarpus*, based entirely on leaf anatomy.

12.26–8. Dicotyledons

See also *For. Abstr.* 12 (Nos. 910, 1143, 1155–6).

1017. SMITH, A. C. **Studies of Pacific Island plants. VII. Further notes on Fijian flowering plants.** *J. Arnold Arbor.* 31 (3), 1950 (288–319). [Smithsonian Institution.]

Includes descriptions of several new tree species.

1018. AIRY SHAW, H. K. **Additions to the flora of Borneo and other Malay Islands: XXII. The Rhizophoraceae, Barringtoniaceae and Cucurbitaceae of the Oxford University Expedition to Sarawak, 1932.** *Kew Bull.* No. 1, 1950 (137–8).

Includes an account of *Barringtonia* (§ *Butonica*) *rhodochlamys* sp. nov.

1019. PELLEGRIN, F. Les Annonacées du Gabon (suite). **[The Annonaceae of Gabon.]** *Repr.* from *Mémoires publiées par la Société Botanique de France, Paris* 1949 (52–73). [F.]

[For previous instalments see *For. Abstr.* 10 (Nos. 1677, 2505).] The present paper covers *Monanthotaxis, Enneastemon, Piptostigma, Neostenanthera, Cleistopholis, Uvaria, Uvariastrum, Uvariodendron, Popowia, Oxymitra, Polyalthia, Polyceratocarpus* and *Xylopia.*

1020. HU, S.-Y. **The genus *Ilex* in China.** *J. Arnold Arbor.* 30 (3–4), 1949 (233–344; 348–87); 31 (1–3), 1950 (39–80; 214–40; 242–63).

Distribution, morphology and taxonomy, with a key to and descriptions of the Chinese species, including some new species, combinations and varieties.

1021. CHATTERJEE, D., and RAIZADA, M. B. **Correct name of Indian Silk-cotton tree (*Semal*).** *Indian For.* 76 (4), 1950 (154–5). 3 refs.

The authors argue the case for rejecting the names *Bombax malabaricum* and *Gossampinus rubra*, in favour of *Salmalia malabarica* (DC.) Schott et Endlicher.

1022. EVREINOFF, V. A. Le plaqueminier du Japon ou kaki. **[*Diospyros kaki.*]** *Fruits d'Outre Mer, Paris* 3 (4), 1948 (124–32). 21 refs. [F.] [Institut Agricole de Toulouse.] D.S.I.R.

Botanical characteristics, chemical composition of and influence of pollination on the fruit, different varieties, budding, grafting, general methods of cultivation, and brief notes on diseases and their control.

1023. SANDWITH, N. Y. **Contributions to the flora of Tropical America. LI. On two new Euphorbiaceae of British Guiana.** *Kew Bull.* No. 1, 1950 (135–6).

Haematostemon guianensis Sandwith, sp. nov. and *Dodecastigma integrifolium* (Lanj.) Lanj. et Sandwith, comb. nov.

1024. AIRY SHAW, H. K. **New or noteworthy species of *Gonystylus* and related genera.** *Kew Bull.* No. 1, 1950 (138–47 + 2 plates).

The section *Aëtoxylon*, originally proposed for *Gonystylus sympetala*, is raised to generic rank with one species *A. sympetalum.* New species of *Gonystylus* and *Amyxa* are described.

1025. CUATRECASAS, J. Gutíferas nuevas o poco conocidas de Colombia. **[New or little known Guttiferae of Colombia.]** *An. Inst. Biol. Univ. Méx.* 20 (1/2), 1949 (91–112). [Span.] C.G.B.

Includes descriptions of new species of *Marila, Tovomita, Tovomitopsis, Rheedia, Oedematopus* and *Clusiella.*

1026. GUINIER, P. Qu'est-ce que le chêne? **[What is the Oak?]** *Bull. Soc. for. Franche-Comté* 25 (14), 1950 (553–89). 45 refs. [F.]

Discusses the genetics, taxonomy and ecology of *Q. robur, Q. sessiliflora* and *Q. pubescens*, with some notes on silvicultural characters and uses. [Cf. *For. Abstr.* 12 (No. 1065).]

1027. LÉONARD, J. Étude botanique des copaliers au Congo Belge. **[A botanical study of the copal-bearing trees of the Belgian Congo.]** *Bull. agric. Congo belge* 41 (2), 1950 (550–5). [F.] (*Publ. Inst. nat. Étude agron. Congo Belge* (*Sér. sci.*) No. 45.)

The copal-bearing trees of the Belgian Congo are *Copaifera baumiana, C. mildbraedii, Cynometra sessiliflora, Daniella alsteeniana, D. klainei, D. mortehani, D. oliveri, D. pynaerti, Guibourtia demeusei, Tessmannia africana, T. anomala, T. yangambiensis* and *Amherstia* spp. The fossil copal which is found in the superficial strata of the soil and is probably of fairly recent origin, is a mixture of various copals derived from several species, of which the most important appears to be *G. demeusei.* The localization of the gum varies according to the species (in the wood in the *Copaifera* and in the cambium in the *Guibourtia*), and calls for different methods of tapping. Yields are very variable, the most promising species being *G. demeusei*

and *T. anomala*. [Cf. *For. Abstr.* 10 (No. 622); 11 (No. 2166).]

1028. TISSERANT, C. Sur le *Lepidobotrys staudtii* Engl. [**Notes on *L. staudtii*.**] *Bull. Soc. bot. France* 96 (7/9), 1949 (214–6). [F.] O.B.D.

A description of the flowers and fruit.

1029. MUNZ, P. A., and LAUDERMILK, J. D. **A neglected character in Western Ashes (*Fraxinus*).** *El Aliso* 2 (1), 1949 (49–62). L.S.

A microscopic study of the lower epidermis of leaves of *Fraxinus oregona* and *F. velutina* var. *coriacea* showed that they may be distinguished by the size and shape of the cells, the thickness of the cell walls and the microscopic ridges (sculpturing) of the epidermal cells. *F. oregona* var. *glabra* appears to be a synonym of *F. velutina* var. *coriacea*. True *F. oregona* does not occur in modern times south of Tulare Country, Calif.

1030. POURTET, J. Les peupliers baumiers et leurs hybrides. [**The Balsam Poplars and their hybrids.**] *Rev. for. franç.* No. 6, 1950 (317–22). [F.]

A short account of this section of *Populus*, and an estimate of their suitability for planting in France.

1031. LEGRIS, P. Le benjoin dans la province de Sam Neua. [***Styrax tonkinensis* in the province of Sam Neua.**] *Rev. int. Bot. appl. Agric. trop.* 29 (325/6), 1949 (612–5). [F.] P.R.

Description, habitat, cultivation, exploitation.

1032. LAY, K. K. **A revision of the genus *Heliocarpus* L.** *Ann. Mo. bot. Gdn.* 36 (4), 1949 (507–41). O.B.D.

13. FOREST ZOOLOGY

See also *For. Abstr.* 12 (Nos. 1202–6, 1582 *et seq.*)

1033. KURENTSOV, A. I. Novÿe dannÿe po faune koroedov (Coleoptera, Ipidae) Primorskogo Kraya. [**New data on the bark-beetle fauna of the Maritime Region [Soviet Far East].**] *Entomologicheskoe Obozrenie, Moskva* 30 (1/2), 1948 (50–2). [Russ.] X.

Includes descriptions of *Xyleborus quercus* sp. nov., found on dying *Quercus mongolica*, and *X. punctulatus* sp. nov., found in logs of the same species.

1034. PFEFFER, A., and PŘÍHODA, A. Vztah mezi kůrovci a houbami. [**Interrelations of bark beetles and fungi.**] *Ochr. Rost.* 23 (2), 1950 (115–27). 14 refs. [Cz.russ.f.] E.M.B.

Briefly reviews the associations of true bark-beetles and ambrosia beetles with fungi, and draws special attention to the intermediate condition shown by certain species of *Lymantor* which have mycetophagous larvae. For *L. coryli* on *Corylus avellana* in Czechoslovakia the authors have identified the fungus as *Diaporthe conjuncta*, and for *L. aceris* on *Rhamnus frangula* in Slovakia the associated fungi were *Dothiora rhamni*, with its conidial form *Sphaeronema rhamni*, and an unidentified species of *Massaria*, of which a Latin description is given.

1035. PEKLO, J., and ŠATAVA, J. **Fixation of free nitrogen by insects.** *Experientia, Basle* 6 (5), 1950 (190–2). 10 refs. [E.g.] O.R.S.

A brief account of investigations proving that pure cultures of symbionts from the larvae of certain insects, including bark-beetles (*Ips* sp.) are able to fix atmospheric N. A small *Torulopsis* was also isolated from the ambrosia fungus associated with *Xyleborus dispar*, and, in pure culture, fixed 24% of free N in a week. [Cf. *For. Abstr.* 10 (No. 2510).]

1036. BRADLEY, G. A. **Notes on the conifer aphids, genus *Cinara*.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (3), 1950 (2).

1037. SULLIVAN, C. R., and GREEN, G. W. **Reactions of larvae of the eastern tent caterpillar, *Malacosoma americanum* (F.), and of the spotless fall webworm, *Hyphantria textor* Harr., to Pentatomid predators.** *Canad. Ent.* 82 (2), 1950 (52). [Forest Insect Laboratory, Sault Ste. Marie.] O.R.S.

Records some special reactions of larvae of the 5th and 6th instars to nymphs and adults of *Podisus placidus* and *P. modestus*. Larvae of *M. americanum* were observed to web the predators into the tent, and *H. textor* larvae to eject them.

2. SILVICULTURE

See also *For. Abstr.* 12 (No. 999).

1038. Köstler, J. Waldbau. **[Silviculture.]** Paul Parey, Lindenstrasse 44–47, Berlin SW 68. 1950. pp. 418. Many refs. [G.]

A textbook on conventional lines, but with strong emphasis on the ecological foundations of forestry, written primarily for the use of German students and drawing its data (81 tables) and illustrations (20 photos) chiefly from German sources. The subject matter is divided into two main parts: (*a*) The forest as a biocoenosis (pp. 11–213) and (*b*) silvicultural treatment regarded as manipulation of the biocoenosis (pp. 215–400). There are 91 sections, most of them headed by references to literature, and also author and subject indexes.

1039. Zeytinciliğimizin inkişafı için üzmanlar toplantısında alınan kararlar. **[Resolutions passed at a meeting of directors and experts to consider the development of the Olive industry.]** *T. C. Tarım Bakanlığı Dergisi* 2 (9), 1948 (33–4). [Turk.] C.G.B.

Account of a conference held in April 1948 [Ankara?], at the invitation of the Ministry of Agriculture, between its representatives and Olive-growing experts, which included discussions on improving cultivation of the wild Olive. This is found in belts 50 km. deep and to a height of 400 m. above sea level along the Mediterranean coast from Italy and the coasts of the Aegean, sea of Marmara and part of the Black Sea. New sets of regulations were drafted to supplement the current law No. 3573 of 1939 and accelerate the pace of improvement. They provide *inter alia* for a survey of the wild Olive forests, thinning, grafting and pruning, nurseries in 4 localities and the setting up of a Department of Olive Culture and an Olive Institute.

1040. Bellouard, P. Le ronier en A.O.F. **[*Borassus aethiopium* in French Equatorial Africa.]** *Bois For. Trop.* No. 14, 1950 (117–26). [F.e.span.]

Describes distribution, vegetation phases, silviculture and uses. Examination of existing stands showed regression of this Palm. [Cf. *For. Abstr.* 12 (No. 990).]

21. SILVICULTURAL CHARACTERS OF TREE SPECIES

See also *For. Abstr.* 12 (Nos. 925, 931, 965, 984–9, 1014, 1022 1030, 1075, 1543).

21.0. *Adaptability to the General Environment. Acclimatization*

See also *For. Abstr.* 12 (Nos. 950, 1030).

1041. Mulligan, B. O. **The White-bark Pine.** *J.R. hort. Soc.* 75 (5), 1950 (197–8). O.B.D.

Brief notes on *Pinus albicaulis* growing in the Cascade Mountains, Central Washington.

1042. Hubbard, M. **Western Red Cedar [*Thuja plicata.*]** *Wood* 15 (6), 1950 (217).

1043. Hiley, W. E. **The Western Hemlock.** *Quart. J. For.* 44 (3), 1950 (128–36 + 4 photos). 8 refs.

Reviews the recent change of opinion in America on *Tsuga heterophylla*, formerly regarded as worthless, but now considered an excellent pulpwood species, and good for flooring, box shooks and other purposes. Growth data from Washington and British Columbia are compared with comparable data from plots in Devon, Somerset and Perthshire. It appears from these figures that the increment in British plantations corresponds fairly closely with that of American stands of the same site index. Comparison with data for increment of Douglas Fir suggests that Hemlock is more sensitive to site quality.

1044. Sealy, J. R., and Webb, D. A. **Biological flora of the British Isles, No. 1311. *Arbutus unedo* L.** *J. Ecol.* 38 (1), 1950 (223–36). 24 refs.

Cf. *For. Abstr.* 11 (No. 2553).

1045. Pratt, E. R. **The fastest growing tree.** *Quart. J. For.* 44 (3), 1950 (142–4 + 3 photos).

For 25 years experiments have been carried out on the Ryston Estate near Downham Market, Norfolk, to determine the best species of Poplar to grow commercially. The results

all point to *P. eugenei*. Not only has it the best habit of growth, but it is also the fastest growing of all the species tried, and very largely immune to canker.

1046. LANYI, J. Adatok a hazai vöröstölgy fejlödéséröl. [**Some facts concerning the growth of Red Oak** [*Q. borealis*] **in Hungary.**] *Erdész. Lap.* 85 (11), 1949 (258–60). [Hu.russ.e.f.]

Early in 1949 a nation-wide inquiry was begun to ascertain the merits of *Q. rubra* [*Q. borealis*], as compared with common Oak (*Q. robur* and *Q. sessiliflora*) and *Q. cerris*—a revival of an old controversy. While final results are not yet available, the writer's measurements (diam. and height) of reasonably comparable sets of trees 49 to 50 years old show that *Q. rubra* averages 30 cm. in. d.b.h. and 19·8 m. in total height against 20·5 cm. and 17 m. for common Oak and 19·5 cm. and 16·8 for *Q. cerris*. Corresponding timber volumes are given, using Schwappach's volume tables for common Oak. In view of the latter's superior commercial value, the writer would at most consider mixing *Q. rubra* with it, especially with Scots Pine on sandy soil: but *Q. rubra* could well supplant *Q. cerris*, to which it is superior in growth and timber value, and as a soil improver. The scope for this is shown by figures for Transdanubia, where common Oak covers 182,906 and *Q. cerris* 160,701 *holds* [1 hold = 1·43 acre] and particular districts (named) have a large preponderance of *Q. cerris*. In the writer's experience *Q. rubra* is fairly tolerant of soil conditions in Hungary and he has nowhere failed with experimental planting. The bottleneck is seed, as seedbearing stands in Hungary are few.

1047. FERRÉ, Y. DE, and GAUSSEN, H. La forêt de Jouéou. III. Histoire de l'expérience de 1939 à 1945. [**The forest of Jouéou. III. History of the experiment from 1939–45.**] *Trav. Lab. for. Toulouse* 6 (1) Art. 5, 1946, (11–20). [F.]

The earlier report on this experiment in planting exotics in the Pyrenees was published in 1939. The principal result during 1939–45 was the success of *Abies faxoniana* and *Picea asperata*.

1048. GAUSSEN, H. Les châtaigniers japonais au pays basque et dans le sud-ouest pyrénéen. [**Japanese Chestnuts in the Basque country and the Pyrenean south-west [of France].**] *Trav. Lab. for. Toulouse* 1 (4) Art. 13, [1945?]. pp. 27 + 3 photos. 10 refs. [F.]

An account of plantations made at the beginning of the present century when the native *C. sativa* was infested with the Chestnut ink disease. Data are given on height, diameter, and m.a.i., and emphasis is laid on the need of establishing the identity of the species and varieties involved, which are described in some detail.

1049. PAVARI, A. Il castagno cinese (*Castanea mollissima* Blume). [**The Chinese Chestnut, *C. mollissima*.**] *Monti e Boschi* No. 1, 1950 (20–6). [It.]

A short general account of the species and discussion of its suitability for planting in Italy.

1050. B[ARNARD], R. C. **Promising exotics.** *Malay. Forester* 12 (4), 1949 (212).

Eucalyptus deglupta planted at Kepong 8 or 9 years ago was 100 ft. tall with an over-bark d.b.h. of 20·5 in. Length of clear bole was 45 ft., volume under bark to the first branch was 73·6 cu. ft., merchantable quarter-girth volume o.b. 52·2 cu. ft., and top diameter o.b. 15·4 in. Periodic mean annual girth increment was between 7 and 8 in.

A *Hymenaea courbaril*, 22 years old from seed, was 108 ft. tall with an o.b. d.b.h. of 19·3 in. Length of clear bole was 32 ft., true volume u.b. to first branch 51·6 cu. ft., merchantable quarter-girth volume o.b. 41·0 cu. ft., and top diameter [o.b.?] 17·0 in. Periodic m.a.i. (girth) was 2·8 in.

A tree of *Swietenia macrophylla*, felled in Bukit Bruang Reserve, Malacca, in 1936 when 33 years old, was 82 ft. tall with an o.b. d.b.h. of 21·5in., periodic m.a.i. (girth?) 2·1 in.

All these trees had grown on moderately to very degraded sites and all were sound at heart. The poor length of clear bole is no doubt largely due to open conditions or to their having outstripped the neighbouring trees of other species. All 3 species appear to produce fruit in fair quantity regularly, and *E. deglupta*, which has been reported in flower 3 years after planting, is usually flowering or fruiting during most of the year at Kepong. Nursery and planting technique for these species is now being studied.

21.8. *Phenology*

See also *For. Abstr.* 12
(Nos. 927, 956, 1075, 1154).

1051. POOLE, A. L. **Notes on the 1949 Beech seeding.** *N.Z. J. For.* 6 (1), 1949 (51–4).

Notes on the flowering of *Nothofagus* spp. in New Zealand. [Cf. *For. Abstr.* 11 (No. 972).]

1052. FACEY, V. **Abscission of leaves in *Fraxinus americana* L.** *New Phytol.* 49 (1), 1950 (103–16 + 1 plate). 41 refs. [University of North Dakota, Grand Forks.] O.R.S.

Anatomical and microchemical studies were made of the abscission zone and of the tissues on each side of it. The first observable chemical change was from Ca pectate to pectic acid. Experiments were undertaken (1) to encourage this transformation by artificially lowering the pH of the abscission region, and (2) to discourage it in autumn by maintaining an alkaline reaction in the cells. For (1), branches of *Fraxinus americana* were placed with the cut ends in small bottles containing 50 ml. of various solutions of HCl. Leaf-fall was hastened only when acid was present in toxic concentrations. It was confirmed that the preliminary change is from Ca pectate to pectic acid, but this is not sufficient to cause leaf-fall, which ensues only when the pectic acid has been changed to pectin, the necessary Me groups being probably produced by degenerative processes in the leaf. The pectin, being soluble in water, ceases to be a factor in the retention of the leaves. For (2), NH_3 vapour was used to bring about an alkaline reaction in the cells. When care was taken to avoid toxic effects from the NH_3, leaflets remained attached after those of controls had fallen. Micro-chemical investigations confirmed that the change from Ca pectate to pectic acid had been prevented. The greater part of the cellulose in the cell walls remains after abscission, but has a mucilaginous consistency and shows very slight resistance to breakage. This extreme softening of the cell wall takes place in a layer 1 or 2 cells thick across the base of the petiole, lignification having previously developed on both sides of this layer.

1053. WESTER, H. V., and MARTH, P. C. **Growth regulators prolong the bloom of oriental flowering Cherries and Dogwood.** *Science* 111 (2892), 1950 (611). [Department of the Interior, Washington, D.C., and Agricultural Research Administration, U.S.D.A., Beltsville, Md.] O.R.S.

A brief account of experiments with α-naphthaleneacetic acid, β-naphthoxyacetic acid, indolebutyric acid and *p*-chlorophenoxyacetic acid on various flowering shrubs and trees. *Cornus florida* and varieties of *Prunus yedoensis* and *P. serrulata* responded best.

1054. SEIFRIZ, W. **Gregarious flowering of *Chusquea*.** *Nature, Lond.* 165 (4199), 1950 (635–6). 5 refs.

Adduces evidence from Jamaica that the periodicity of gregarious flowering of *Chusquea abietifolia* is about 32 years—the same as that of gregariously flowering Asiatic Bamboos.

22. SILVICULTURAL SYSTEMS. FORMS OF STAND

22.1. *High Forest Forms*

See also *For. Abstr.* 12
(Nos. 1070, 1074–5).

1055. ROLLETT, E. I boschi resinosi della Venezia Tridentina. [**The coniferous woods of Tridentine Venezia.**] *Monti e Boschi* No. 6, 1950 (260–5). [It.]

Deals chiefly with methods of obtaining natural regeneration of *Picea abies*. The author recommends clear-felling in strips or group selection. Natural regeneration of Silver Fir, Larch, and *Pinus cembra* is discussed more shortly.

1056. AZQUETA Y GOITIA, J. M. Realidades y posibilidades del *Pinus radiata* Dougl. [**Facts and possibilities for *P. radiata*.**] *Montes, Madrid* 6 (32), 1950 (155–63). [Span.]

Discusses in a general fashion some points relating to the regeneration and management of *P. radiata* in Spain.

1057. BARNARD, R. C. **The elements of Malayan silviculture 1950: lowland Dipterocarp forest.** *Malay. Forester* 13 (3), 1950 (122–9). 7 refs.

The approved silvicultural system in lowland Dipterocarp forest, excluding freshwater

swamp, is complete exploitation in one operation over advance growth. Subsequent tending will aim at the development of several-storeyed, even-aged forest with a balanced stocking of emergent and main-storey timber species. Milliacre sampling, together with enumeration of exploitable trees, to ascertain composition and distribution of seedlings and seedbearers respectively and to estimate the yield, is carried out prior to felling. As felling progresses, unexploitable and useless stems are poison-girdled. Subsequent assistance to economic regeneration is based upon the data obtained in linear regeneration samplings carried out at three to five years and again about ten years after felling is completed. Notes on the organization of tending operations are included. *Author's summary.*

1058. KERNAN, H. S. **Heavy cutting in Northern hardwoods.** *J. For.* 48 (7), 1950 (396–7).

The author argues that selective cutting is unsuited to the Birch/Beech/Maple type of the N.E. United States, which will only regenerate in full sunlight. The system he proposes is to encourage the lumbermen to cut every tree they consider merchantable, and after about 3 years, when a young crop has appeared, to girdle all the surviving cull trees from the old crop.

1059. THOMSON, C. C. **Experimental cutting in an old Red Spruce stand in Southern New Brunswick.** *Silv. Res. Note For. Br. Can.* No. 98, 1950. pp. 22. 3 refs.

Experimental cuttings were made during 1924–25 in an old stand of Red Spruce near the Bay of Fundy coast of New Brunswick. The methods used were:—(I) Economic selection to a 6-inch stump on alternate 2-chain-wide strips; the remaining strips cut on the same basis in 1938–39. (II) Diameter limit to a 12-in. stump plus about half of the remaining trees to a 6-in. stump. (III) Transition shelterwood in two cuts, the second being made in 1938–39.

Periodic net increment of softwood for the period 1924–46 was approximately the same on (II) and (III), about 50% lower on (I). The residual stands responded well to release as reflected in diameter increment, because many trees of younger age classes were present in the old stand. By 1946 almost the whole experimental area had restocked copiously with softwoods and it seemed likely that much of the succession will be above optimum density. Area (II) contained the largest proportion of Spruce in its new stand, followed by (I) and (III) in that order.

The modified diameter-limit method used has shown both economic and silvicultural advantages over the other two methods. A combined diameter-limit and selective method is proposed in which trees to be cut below the 12-in. limit would be marked. There is evidence that optimum volume removal from the original stand, as cutting approached economic selection to a 6-in. stump, would have fallen somewhere between the 74% of softwood volume which was cut from the diameter-limit area and the 91% which was cut from the 1924–25 cut strips. *From author's summary.*

1060. **Selection logging—harmful or beneficial to the bunchgrass cover.** *Rep. Sthwest. For. Range Exp. Sta. 1949*, 1950 (10–2).

Slash accumulations and surface disturbance resulting from selective logging (removal of up to 65% of volume) of Pine in Texas destroy considerable amounts of herbaceous cover. Increase of herbaceous cover following release could be favoured by slash disposal and re-sowing of roads and skid trails.

22.2 *Coppice Forest*

1061. PLAISANCE and HIRSCH, P. Problèmes du taillis sous futaie. [**Problems of coppice with standards.**] *Bull. Com. For., Paris* 13 (82), 1949 (1180–93). [F.]

Two papers in which the writers discuss the disappearance of Oak from the forests on calcareous soils in eastern France [cf. *For. Abstr.* 12 (No. 1065)] and propose various remedies, including sowing of acorns on felling sites.

22.6. *Changes of Silvicultural System*

1062. WŁOCZEWSKI, T. Zasady planowania przemiany drzewostanów. [**The principles of planning stand conversion.**] *Wydaw. pomocn. tech.-gosp.* (*Ser. B*) *Inst. Bad. Leśn.* No. 23, 1949. pp. 30 [Pol.]

A general account for the subordinate forest staff.

22.8. *Forms of Stand*

See also *For. Abstr.* 12 (Nos. 1110–2).

1063. Evans, J. D. D. **Red Cedar and European Larch in mixture.** *Quart. J. For.* 44 (3), 1950 (137–42 + 3 photos).

Describes the technique which the author has evolved for growing these two species (*Thuja plicata* and *Larix decidua*) as a mixed two- or even three-storeyed crop, and discusses the advantages of this method, chief of which is the immunity of the Larch from canker attack. A suggested nursery technique for raising *Thuja* is also given, by which, it is claimed, the danger of *Keithia thujina* attack is reduced to a minimum. Seed is carefully cleaned to avoid contamination from particles of affected foliage from parent trees, and sown thinly in widely spaced drills with a light covering of fine river gravel. The beds are continuously weeded, if necessary throughout the winter. Lining out should be done at 12 in. or more between rows and 4 in. between plants. With thin sowing and special treatment it may even be possible to raise plants large enough to go out direct for autumn planting as 2-year-old seedlings. The great object must always be to avoid seedbed crowding. If seedlings are attacked by the fungus, however, they often recover completely when lined out.

1064. Coincy, de. Chêne rouge et pin maritime en Gascogne. **[Red Oak and Maritime Pine in Gascony.]** *C.R. Acad. Agric. France* 33 (1), 1947 (64–5). [F.] I.I.E.

The author recommends the planting of small numbers of American Red Oak (*Quercus rubra* [*Q. borealis*?]) among the Maritime Pines of the Landes, in order to counteract the dangers which are apt to arise in pure stands. Red Oak would be particularly useful along roads and fire-breaks, since its foliage suppresses the growth of ground vegetation and hence reduces scrub clearance costs. To create mixed stands on fallow or abandoned land, rows of young Red Oak (4–5 years old) should be planted. Between the rows, and at a distance of 1 m. from them, strips 1 m. wide should be sown broadcast with *Pinus pinaster*. The Pines are thinned, as necessary, throughout their growth. Another method is to plant Pine of the same age as the Oak in alternate rows with them, giving a distance of 2 m. between the rows and 1·50 m. between the Pines.

1065. Guinier, P. L'évolution des forêts sur les plateaux calcaires de l'est. **[The evolution of the forests on the calcareous plateaux of the east [of France].]** *Bull. Com. For., Paris* 13 (82), 1949 (1135–50). [F.]

The two main species in these forests are Oak (*Q. sessiliflora*) and Beech. Prehistoric and protohistoric evidence from charcoal etc. indicates that Beech was the principal, if not only, natural species in these forests from an early date. Oak is found principally on the borders of the forests, which have been worked immemorially as coppice for firewood. The policy of converting these coppice woodlands to high forest, pursued during the last 125 years, has resulted in the steady regression of Oak. The author considers that the only way of maintaining some Oak in these forests, which are naturally a Beech climax, is by group regeneration, which depends on the chance coincidence of a forest opening with an Oak mast year. A judicious introduction of suitable coniferous species offers better prospects for the production of valuable sawtimber. [Cf. *For. Abstr.* 12 (No. 1061).]

1066. Krÿzhanovski, K. V. O razmeshchenii porod v lesnÿkh kulturakh. **[On the spatial arrangement of species in forest plantations.]** *Agrobiologiya* 1949 (6), (99–106). 1 ref. [Russ.] [Shipovskaya Lesnaya Opÿtnaya Stantsiya, Puzevo, Voronezh Province.] A.P.B.

Discusses the problem of interspecific competition, emphasizing the role of competition between tree species for light as usually more important than that for moisture and nutrients, except on poor, dry soils (especially sandy ones) where often only Pine can be grown and competition from herbaceous ground vegetation is the rule.

In the case of young Oak plantations, the severest competition comes first from herbaceous vegetation and is relieved by weeding and loosening of the soil, but these measures are sometimes disastrous in the forest steppe and steppe regions, where in hot weather the young Oak may be severely burnt at the root

collar. In the next stage, fast growing coppice of other species may cause trouble: here repeated cleaning of the whole area is necessary, since if only strips are cleaned, the coppice quickly closes in again from the sides.

Certain areas in the Shipov and Tellerman forests, Voronezh Province, show excellent Oak regeneration which, as a rule, has been derived from dense advance growth established in mast years. In such areas the density of the advance growth has enabled Oak to suppress grass and coppice shoots and has provided shade for the root collars; in addition, being nearly pure, the crop obtained is relatively uniform in height.

Experience with Pine has shown that dense advance growth, obtained in successive regeneration fellings, gives the best regeneration. Spruce also is said to do best when protected from frosts by a Spruce canopy, though it will regenerate under Birch and Aspen and gradually form the main stand after a long period of suppression.

It is concluded that, in competition, pure, dense groups stand the best chance of survival. This is borne out by Oak plantation trials in the Shipov Experimental Forest, where dense sowings and plantings usually gave the best results as regards survival and growth.

Reference is made to the success achieved by Stretovich, in the same province, with strip mixtures of Oak/Pine, and Pine/Birch. The first was formed by sowing the Oak in strips of 4–5 rows, using the intervening strips for agricultural crops until the fourth year, when the Oak was as tall as the 2-year-old Pine seedlings to be planted on them. The second mixture was established in a similar manner, but 2-year-old seedlings were used for both species, the Birch being planted 2 years after the Pine. Lÿsenko's patch ('nest') method [cf. *For. Abstr.* 11 (No. 289), 12 (No. 320–1)] is acclaimed as a brilliant development of such earlier methods. Its principle is regarded as established, but experiments will be needed to determine optimum densities of sowing or planting, optimum sizes of 'nest' etc.

The author stresses the importance for all tree plantations of the notion of the 'target age', i.e. the age at which they will yield the maximum useful effect for the purpose in mind. In the case of shelterbelts, height is the most important, and the 'target age' may be regarded for practical purposes as coinciding with the flattening of the height-increment curve. He also urges that such plantations should be planned on the basis of the 'target age' in terms of the spatial units to be occupied at that age by a tree of a given main species. This can be done from yield tables, e.g. such tables will show that the height-increment curve for Oak of site quality I should be flattening out at *ca.* 90 years, when there should be 328 trees per ha., giving an area of 30 sq. m. (5·5 × 5·5 m.) per tree. This figure will represent the minimum initial strip width, or the minimum distance between 'nests', as the case may be. Slight adjustments could be made to allow for the use of standard machinery for cultivating, sowing, planting and tending.

1067. Ogievski, V. V. K voprosu o sposobakh smesheniya drevesnÿkh i kustarnikovÿkh porod. **[On methods of forming mixtures of tree and shrub species.]** *Agrobiologiya* 1949 (6), (107–10). 2 refs. [Russ.] [Lesotekhnicheskaya Akademiya, Leningrad.] A.P.B.

Discusses, with special reference to Lÿsenko's views on competition and mutual aid between species, the advantages and disadvantages of several methods of forming mixtures, concluding that with most methods it is difficult to control the eventual structure and composition of the stands. This is particularly so where the mutual behaviour of the species, as influenced by age and site, is imperfectly known. In such cases it is necessary to set limits to the interaction of the species planted, or to create optimum conditions for its artificial regulation. Only 3 methods appear really acceptable: (1) Lÿsenko's 'nest' method [see *For. Abstr.* 12 (Nos. 320–1)]; (2) chequerboard arrangements, with squares each of one species only, or one species plus tried auxiliary species (shrubs); and (3) alternate multi-row strips in each of which short sections ('links') are planted or sown with different dominants, either pure or mixed with some non-antagonistic species. Such methods, in which the dominants alternate by groups, enable the forester to fit the species to the site where knowledge is adequate, and where it is imperfect, still give a better chance of success and facilitate silvicultural intervention by man.

1068. Matyuk, I. S. O mezhvidovoy bor'be i vzaimopomoshchi drevesnÿkh porod v zashchitnÿkh lesnÿkh nasazhdeniyakh na peskakh. **[On interspecific competition and**

mutual aid among woody species in protective forest stands on sands.] *Agrobiologiya* 1949 (6), (111–22). [Russ.] [Vsesoyuznŷ n.-i. Institut Agrolesomelioratsii, Moscow.] A.P.B.

In support of Lŷsenko's views on interspecific competition the author details the experience gained in the afforestation of the Chir sands, Rostov Province [cf. *For. Abstr.* 9 (No. 860)], emphasizing the complete or partial failure of *Pinus sylvestris* in mixture with various hardwoods (*Quercus robur*, *Robinia pseudoacacia*, *Populus nigra*, 'Canadian' Poplar, *Betula verrucosa*, and *Ulmus parvifolia*). In the case of *P. sylvestris* with *Fraxinus pennsylvanica* it was the Pine that suppressed the Ash. Examples are also quoted of mixtures of *P. sylvestris* with *Salix acutifolia* in which natural regeneration occurred. These showed that though regeneration of the Pine was favoured by the shelter of the Willow, and growth was better up to 9 years of age than where no Willow was present, the latter afterwards began to whip the Pine, causing dieback. On the sands in question Pine grows best in pure, closed stands. [Cf. *For. Abstr.* 12 (No. 301).]

1069. Navez, R. La pineraie des Trieux Chalon. [**The Pine wood of Les Trieux Chalon.**] *Bull. Soc. for. Belg.* 57 (7), 1950 (249–61). [F.]

Account of plantations of Austrian Pine made between 1898 and 1907 by the town of Couvin in Belgium on a calcareous soil, their growth and treatment. Clear felling and replanting are recommended.

23. FORMATION OF STANDS

23.1. *Natural Regeneration*

See also *For. Abstr.* 12 (Nos. 1055, 1057–9, 1078).

1070. Vanselow, K. Theorie und Praxis der natürlichen Verjüngung im Wirtschaftswald. [**The theory and practice of natural regeneration in the production forest.**] Neumann Verlag, Radebeul & Berlin. 2nd ed. (rev.) 1949. pp. 367. Many refs. [G.] Price *DM*23 [£2. 4*s*. 6*d*.]

The plan remains the same as that of the 1931 edition, but all sections have been revised and 4 new ones added, dealing with: the composition and structure of naturally regenerated forest areas; light increment and natural regeneration; the Swiss Femelschlag; and the transition from artificial to natural regeneration.

1071. Little, S., and Moore, E. B. **Effect of prescribed burns and shelterwood cutting on reproduction of Shortleaf and Pitch Pine.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 35, 1950. pp. 12.

The results of these studies confirm earlier reports on the value of controlled burning in preparing a seedbed favourable to the establishment of Pine reproduction [cf. *For. Abstr.* 10 (No. 2550); 11 (No. 149)]. For obtaining prompt and adequate Pine reproduction in the New Jersey Pine region, the following sequence of treatments is recommended:—(1) a shelterwood cutting, if the stand is dense; (2) several annual or periodic controlled burns; (3) delay of final cutting until sufficient reproduction is already established. A few seed trees may be left to provide some insurance against accidental destruction of reproduction.

1072. Bruce, D. **Seed loss to birds unimportant on fresh burns.** *Sth. For. Note Sth. For. Exp. Sta.* No. 63, 1949 (3–4).

In S. Mississippi in 1947 and 1948, birds ate very little of the *Pinus palustris* seed on several small, fresh burns having heavy seed supplies, and the difference between open and screened plots was not great. From the 1947 seedfall, the average numbers of seedlings established per acre were:—

	Open	*Screened*	*Average*
Fresh burn	42,700	46,200	43,400
Old rough	8,300	22,600	11,200

The greatly increased catch of seedlings on the screened compared with the open plots on old rough was probably due to the discouragement of rodents. [Cf. *For. Abstr.* 11 (No. 227).]

1073. Ure, J. **The natural regeneration of *Pinus radiata* on Kaingaroa Forest.** *N.Z. J. For.* 6 (1), 1949 (30–8 + 2 photos).

The development of natural regeneration following clear felling has been watched on 3 areas, and it is evident that adequate natural regeneration can be expected on a good site after clear-felling a parent crop 28–30 years old. Regeneration fails or is scanty in frost hollows, and may be limited on steep slopes with a southerly aspect. There is some danger that stocking may be considered inadequate one year after felling, and planting be begun while

germination is still taking place, with the result that money will be thrown away if the stocking is later doubled by natural means. A tentative thinning treatment for such stands is suggested: at 3–4 years thin to 1,000/acre; at 8–9 years thin from 1,000 to 300/acre; at 14–15 years thin from 300 to 150/acre; at 20 years either clear-fell or thin from 150 to 80/acre; and at 30 years clear-fell.

1074. SIRÉN, G. Metsänhoidollisia havaintoja Pohjois-Suomen paksusammal-kairoilta. [**Notes on silviculture in the *Hylocomium/Myrtillus*-type areas.**] *Metsät. Aikak.* 1949 (11), (382–4). [Fi.e.]

A discussion centring on the efficacy of different methods of regeneration in this difficult North Finland type. Selection fellings do not give satisfactory results. The shelterwood system is better, especially with Pine and when combined with soil working or burning of the ground cover. Best results of all are obtained from clear felling, followed by ground clearance or burning and artificial regeneration. On the whole, burning appears to be the most rapid and effective agent for converting these areas into productive forest; the author contends that burning may to some extent be considered a natural agent.

1075. SARVAS, R. Tutkimuksia koivun uudistumisesta eteläsoumessa. [**A study of the regeneration of Birch in South Finland.**] *Commun. Inst. for. Fenn.* No. 35 (4), 1948 (1949). pp. 91. 40 refs. [Fi.e.]

The general conclusion drawn from this study is that Birch is at present a receding species in Finland, its former abundance having been largely due to the custom of felling and burning forest for temporary agriculture, which was forbidden by law in 1928. In the absence of fire, the natural succession is to Spruce. The future of Birch seems to depend on artificial regeneration, which will have to take account of possibilities of breeding.

Of the many factors on which natural regeneration depends, the following are examined in more detail:—the periodicity of seed years, the quantity of seed crops, the germinative capacity of seed, and seed dispersal. The common opinion that Birch produces plentiful crops every year, is untrue. Taking the crop of a good seed year as a standard, it was found that even a crop amounting to barely 20% of the best seed crop occurs on an average only every third year. The crops of the intervening years are ordinarily no more than 5–10% of that of a good seed year. In an ordinary regeneration area of mixed Pine and Birch, the Birch seed crop in a good year was 2,300 filled seed/sq.m. or about 5 kg./ha. On the same area during a period of 3 years the total count was 3,050 filled seed/sq.m. or 7 kg./ha. In most cases, however, the seed crop of Birch is much smaller, and in the cutting areas examined for this study it averaged about 340 filled seed/sq.m. or 0·8 kg./ha.; and on about 10% of the sample plots in clear-cut areas, 36% in seed-tree areas, and 18% in group-selection areas, the crop was less than 100 filled seed/sq.m. It is estimated that in regeneration areas there should be at least 4–8 seed trees, of sawlog size and with spreading crowns, per ha., or a correspondingly larger number of smaller trees, if full stocking is to be obtained without ground preparation. Intended seed trees should be released at least 2 years before the final felling, as heavy crops are not borne until at least 2 years after release.

Germination tests showed that the germinability of *B. verrucosa* decreases, while that of *B. pubescens* increases, in passing from the south to the north of Finland, and this factor is no doubt partly responsible for the corresponding difference in their geographical distribution. Germinability of seed reaches its maximum in good seed years.

In order to determine the dispersal capacity of the seeds, experiments were made with both species of Birch and Scots Pine. Rate of fall was found to be 0·52 m./sec. for *B. verrucosa*, 0·69 m./sec. for *B. pubescens* and 0·65 m./sec. for Pine. It thus appears that the spreading capacity of *B. pubescens* may be inferior to that of Pine seed. The rate of fall of *B. verrucosa* seed is clearly less than that of *B. pubescens*, and since *B. verrucosa* generally attains a greater height and, as a rule, occupies the highest points of the ground, while *B. pubescens* keeps to depressions and swampy lowlands, the difference in the spreading capacity of their seed becomes still greater.

A detailed study of the effects of different cutting systems on Birch regeneration led to the conclusion that it seems to be difficult, or even impossible, to obtain pure Birch stands, or even Birch-dominated stands with satisfactory stocking as a result of natural

regeneration on forest land without soil preparation. There is a difference between the two species in different regeneration areas. In forests which have been burnt over for agricultural crops, *B. verrucosa* regenerates more readily than *B. pubescens*; in clear-cut and shelterwood-cutting areas both do equally well; in group-selection areas the seedlings of *B. pubescens* thrive slightly better than those of *B. verrucosa*, being apparently more shade-tolerant. [Cf. *For. Abstr.* 9 (Nos. 1498–9).]

23.2. *Artificial Regeneration*

See also *For. Abstr.* 12 (Nos. 1074–5, 1642).

1076. MARRERO, J. **Reforestation of degraded lands in Puerto Rico.** *Carib. For.* 11 (1), 1950 (3–24). 32 refs. [E.Span.] [U.S. Trop. For. Exp. Sta.]

Since the climax vegetation of Puerto Rico is forest, the function of artificial reforestation is mainly that of accelerating tree establishment and assuring early yields. Natural succession is usually delayed by site deterioration. Degraded lands in Puerto Rico can be found among the following 3 broad groups: (1) deep soils of the uplands, (2) shallow soils of the uplands, and (3) coastal areas. Species used for reforestation must be capable of rapid growth and be able to survive under adverse planting conditions and withstand weed competition. Some tree species possessing all or some of these characteristics are described, with notes on their adaptability and on methods of propagating and establishing them.

23.22. Preparatory Work. Auxiliary Measures

See also *For. Abstr.* 12 (Nos. 1115, 1119–21).

1077. **Effect of burning on the soil as affecting artificial regeneration.** *Indian For.* 74 (10), 1948 (1950), (349–53). 12 refs.

A review of the literature.

1078. MATUSZ, S. Pługi leśne. [**Forest ploughs.**] *Wydaw. pomocn. tech.-gosp.* (*Ser. B*) *Inst. Bad. Leśn.* No. 21, 1949. pp. 99. 24 refs. [Pol.]

The development and main features of forest ploughs in Poland are described and illustrated along with a new type, of the author's design, in which the chief feature is an adjustable blade or disk for cutting through or riding over obstacles in the way of the ploughshare.

1079. **Plows and disks effective for preparing seedbeds in the woodland openings.** *Rep. Sthwest. For. Range Exp. Sta. 1949*, 1950 (12–3).

Standard disk, wheatland, and Graham-Hoeme type ploughs, and a Towner disk harrow were found effective for preparatory treatment of openings in the Pinyon/Juniper woodland type. All machines destroyed more than 70% of the suffruticose vegetation and produced acceptable stands of seedlings. The standard disk plough was slightly superior to the others, and the Graham-Hoeme plough the least effective. Drilling proved more satisfactory than broadcast sowing, though the latter produced satisfactory stands where the soil was well prepared.

23.23. Seed and Sowings

23.23.1. *Seed Procurement, Treatment, and Testing*

See also *For. Abstr.* 12 (Nos. 1119–21).

1080. JEZIERSKI, A. Wskazóski dla zrywaczy szyszek i nasion leśnych. [**Guide for collectors of cones and forest seeds.**] *Ulotk. Wydaw. pop.* (*Ser. C*) *Inst. Bad. Leśn.* No. 30, 1950. pp. 23 + 13 dgms. [Pol.]

1081. ALARCÓN, F. Sequero de Villabona. [**The Villabona kiln.**] *Montes, Madrid* 6 (32), 1950 (196–8). [Span.]

Describes a seed extractor installed at the Villabona nursery. *Pinus radiata* cones (previously dried to a humidity of 30%) are submitted to a temperature of 45 to 50° C. in a moving drum, the seeds being collected in a small truck and carried to a de-winging machine. The drum holds 600 kg. of cones, and it is estimated that 35,491 calories per hr. are required to dry a charge in 4 hours.

1082. **Sun-drying Slash Pine seed before storage.** *Rep. Sth. For. Exp. Sta. 1949*, 1950 (3).

For storage for several years, Southern Pine seed must be dried to a 9% moisture content and stored at 41° F. or lower. A practical method of preparing *P. caribaea* seed with an unknown but probably high moisture content

for cold storage, is to dry the seed in shallow layers in the sun for 3 days.

1083. LEHOTSKÝ, L. Vplyv uskladnenia na kličivosť semena smreku obecného. **[The influence of storage on the viability of Norway Spruce seed.]** *Pol'ana* 4 (6/7), 1948 (129–30). [Slovak.]

Tests (the sequence of which was interrupted by the war) with 1942–43 seeds kept (*a*) in paper bags, and (*b*) in sealed glass jars, germinated on sawdust in Dec. 1947, gave the following plant % after one month: (*a*) 34 and (*b*) 71.

1084. HOLMES, G. D. **The treatment of seed.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (34–5).

Experiments were made during 1948 to assess the reliability and accuracy of chemical vital-staining methods. A number of chemical compounds were tested, and of these, tetrazolium bromide was selected as the most suitable both for the clarity of embryo staining and for non-toxicity. A satisfactory standard test procedure has been developed, and a classification of stained embryos on the basis of the area stained and density of staining, has been worked out.

Experiments over 2 seasons, using Sitka and Norway Spruce, Scots Pine, and European Larch as test species, gave no evidence to support the practice of soaking seed before sowing, with the exception of Sitka Spruce which showed an increase in final germination after 6 days' soaking (44% germination compared with 26% for unsoaked seed). Acid soaking had very little effect on germination and the final effect of acid treatment at the end of the first season was, if anything, detrimental.

1085. TYSZKIEWICZ, S. Określanie wilgotności nasion metoda barwnej reakcji. **[Determination of the moisture content of seeds by a colour reaction method.]** *Wydaw. pomocn. tech.-gosp. (Ser. B.) Inst. Bad. Leśn.* No. 5, 1949. pp. 4. [Pol.]

A leaflet, with colour chart, explaining the use of Co-salt test papers for determining the moisture content of seeds, particularly Pine and Spruce, and their consequent likely viability.

23.23.3. *Methods of Sowing*

See also *For. Abstr.* 12 (Nos. 1066–7, 1079, 1101, 1105, 1108, 1119–21).

1086. WEITZ, S. **Visit to the forests of Cyprus.** *Forest, Palestine* No. 2, 1950 (15–21, *Suppl.* 4). [Heb.e.]

Observations and conclusions, following the author's visit to Cyprus in 1949. Although natural regeneration of Pines in Israel is better than the results of direct sowing on burnt areas practised in Cyprus, the author recommends the latter method, especially for Galilee, using *P. halepensis*, *P. brutia* and *Cupressus horizontalis*. [Cf. *For. Abstr.* 12 (No. 1105).]

1087. **[Method of sowing *Sarcocephalus diderrichii*.]** *Rep. For. Adm. Nigeria 1948–9*, 1950 (16).

Sowing was effected by pouring a water suspension of the pounded fruit into drills. The method makes the seed less easily found and carried off by a species of red ant which is believed to be a cause of the lack of natural regeneration in plantations of this species.

23.24. Formation of Stands by Planting

See also *For. Abstr.* 12 (Nos. 1100–10).

1088. SPURWAY, B. J. D. **Ru Ronang (*Casuarina sumatrana*) as a plantation crop.** *Malay. Forester* 13 (2), 1950 (73–4 + 2 photos).

A successful experiment was made in planting wilding seedlings of *C. sumatrana* at a spacing of 7 × 7 ft. in prepared lines in a derelict Rubber plantation. The seedlings averaged 8 in. from root tip to top shoot and survival was good. Cleanings were carried out at regular intervals and the canopy opened by poisoning when necessary. It is considered that this species offers good prospects for the establishment of fuel plantations.

23.24.2. *Methods of Planting*

See also *For. Abstr.* 12 (No. 1101).

1089. **Machine planting [of Longleaf Pine.]** *Rep. Sth. For. Exp. Sta. 1949*, 1950 (9–10).

Results of machine versus hand (bar) planting are available for two areas of Longleaf Pine after 2–3 years. Although hand planting gave better survival, the difference is small and is offset by the more regular spacing of live seedlings per row in machine planting. A study was also made to determine whether size

of Longleaf seedling has any significant effect on quality of machine planting. It was found that there is a tendency to plant large stock too shallow and small stock too deep, but there was not much difference in the proportion of properly planted seedlings between size classes.

23.24.3. *Spacing. Geometric Arrangement*

See also *For. Abstr.* 12 (Nos. 1066–8).

1090. **[Spacing of *Sarcocephalus diderrichii*.]** *Rep. For. Adm. Nigeria 1948–9*, 1950 (16–7).

Sarcocephalus diderrichii has hitherto usually been planted at 6 × 6-ft. spacing. In the earliest compartments practically no thinning was done until the trees were almost 80 ft. high, and it is clear that by then they had lost their power to respond. They are still spindly, have put on little girth, and the very small, open crowns are unhealthy. Compartments planted immediately before the war were thinned heavily in their 3rd year and subsequently. These, already widely spaced, show a strong, healthy growth in height as well as girth, and vigorous crowns. It is clear that this species, which grows quite straight and cleans itself to a remarkable degree, must not receive the slightest check at any stage and must have ample room to spread its crown. Future planting will be done at 12 × 12 ft. and the closest attention paid to thinning to anticipate any check in growth.

23.26. Plant Rearing. Nursery Practice

See also *For. Abstr.* 12 (Nos. 952–5, 1598).

1091. CROWTHER, E. M. **Committee on nutrition problems in forest nurseries: summary report on 1948 experiments.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (60–4).

Many transplant experiments were carried out to test the growth, under uniform conditions, of Sitka Spruce seedlings which had received contrasted treatments in the seedbeds. The plants generally evened up, but the effects of a few treatments were still shown. Large, tender plants obtained by watering seedbeds in the drought year 1947 gave smaller transplants than those left unwatered, but additional height due to N fertilizers given to 1947 seedbeds persisted in the transplants. Transplant manuring experiments with Sitka Spruce in a very acid moorland soil and on a calcareous agricultural soil, showed large responses in height to superphosphate applied before lining out and to ammonium sulphate given as a top dressing in April. The only failure was on an unusually acid sandy soil (pH *ca.* 4·0) at Wareham, where a top dressing with ammonium sulphate checked height growth; other soluble N fertilizers gave good results.

1092. EDWARDS, M. V., and HOLMES, G. D. **Experimental work in the nursery.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (35–43).

Among the subjects dealt with in this report are the following (except where otherwise stated, all results apply to 1-year-old Sitka Spruce):—

Partial soil sterilization and manuring: A comparison of steam and formalin sterilization gave the following results. Steam reduced weeding time by 60–97%, increased mean height at 1 year by 20–80%, and increased the number of usable 1-year seedlings per lb. of seed by 50–70%. Formalin was less effective than steam as a weed-killer, but it reduced weeding time by 20–70%, and it was generally more effective than steam in increasing height growth and in number of usable plants. Methods of sterilization are described. The chief effect of farmyard manure was to reduce the number of seedlings and increase weed growth. Even sterilization after manuring was not entirely effective in reducing weeding. The beneficial effects of farmyard manure are usually seen in the 2nd year. Nitrochalk top-dressing was very effective and more so with sterilizers than without, as was ammonium sulphate top-dressing. A combined phosphate and K dressing had little effect in unsterilized soil, or with farmyard manure on sterilized soil, but elsewhere it was effective. Methods of steaming and formalin sterilization are described.

Acidification: In view of recent evidence that many nurseries have been overlimed in the past, the effect of H_2SO_4, ammonium sulphate, and S, at 3 levels of application, was tested at 5 nurseries, and H_2SO_4 at 2 others. Acidification had markedly beneficial results, increasing the mean height of 1-year-old seedlings by 0·2–0·8 in.

Seedbed investigations: The value of a number

of hardwood and coniferous sawdust grades and mixtures was compared in Alice Holt nursery with standard 2,L.Bedford sand and nursery soil. The following tentative observations were made:—Sitka Spruce: coarse sand, and a 50 : 50 mixture by volume of conifer sawdust and sand, were superior to all other covers used; hardwood sawdust and nursery soil were definitely harmful. Norway Spruce: hardwood sawdust plus sand was best, but conifer sawdust and conifer sawdust plus sand were almost as good. Scots Pine: hardwood sawdust and nursery soil were both markedly superior to the other media.

Watering of seedbeds: A series of experiments has been undertaken at Wareham and Kennington, to estimate the effect of watering on composted and uncomposted seedbeds of Sitka Spruce. After 2 years the data obtained from a range of sites are very similar and show that, in general, watering alone had no effect on height growth, whereas the addition of compost without watering greatly increased height growth and production of usable seedlings. Watering of composted beds gives an increased response, especially in a dry season.

Shading of seedbeds: Two sheltering treatments were applied—continuous lath cover over the beds from the date of sowing, and periodic cover when the screen temperature reached 70° F. for two consecutive days. Shading effects were very similar in the particularly hot, dry season of 1947 and the milder and moist season of 1948. European Larch, Douglas Fir and *Thuja plicata* were scarcely affected at all. Sitka Spruce showed a marked response to shade. With April sowings in 1948, a 50% increase in yield of usable seedlings was obtained with periodic lath shelter. Continuous shelter, on the other hand, proved harmful, and the seedling yield was only half that of completely unshaded beds. This reduction of yield by continuous shelter was not noticeable during the hot summer of 1947.

Selective weed-killers in conifer seedbeds: Out of 11 chemicals used, the following proved relatively harmless to the 3 species tested (Douglas Fir, Japanese Larch, and Corsican Pine)—ethyl phenyl carbamate at 0·5%, sodium methyl chlor-phenoxy acetic acid (a growth-regulating substance), and two aromatic petroleum products. The results are of considerable interest, as both the petroleum products are known to be almost certain death to *Poa annua*, *Chenopodium* spp., and *Arrhenatherum*, and severely injurious to spurrey and chickweed, all of which can be serious nursery weeds.

Vegetative propagation: Experiments were made to determine the best conditions for outside propagation of cuttings of Sitka Spruce and Weymouth Pine [*Pinus strobus*]. Interim survival counts show acid peat in ⅓ admixture with coarse Bedford sand to be the most suitable rooting medium for both species. There is no marked response to growth substances, the highest survival being in untreated cuttings or cuttings treated with the lowest hormone concentration (500 p.p.m. indole-acetic acid). *P. strobus* is unsuited to vegetative propagation in the open, but Sitka Spruce can be propagated in this way, given lath shade to prevent undue heat. Successful trials were also made in propagating summer cuttings of Sitka Spruce and *Cupressocyparis* in cold frames.

1093. [**Nursery practice for Longleaf Pine.**] *Rep. Sth. For. Exp. Sta. 1949*, 1950 (3–5).

Seedlings of Longleaf Pine from autumn-sown seed were definitely superior to spring-sown, probably because they were almost free from root rot. In all tests where sawdust was added to the nursery beds, the transplants survived better than where no sawdust was added: 80% of autumn-sown seedlings from sawdust-treated beds showed fair or better vigour at the end of the first season in the field, compared with 76% from untreated beds; comparable figures for spring-sown seedlings were 68 and 53% respectively.

1094. ZAPPE, M. P. **Laws and regulations concerning the inspection of nurseries in Connecticut and transportation of nursery stock.** *Circ. Conn. agric. Exp. Sta.* No. 163, 1946. pp. 41.

1095. VEIGA, A. DE ARRUDA. O que já se fez no Horto Florestal de Batatais. [**Present activities of the Batatais Forest Nursery.**] *Rev. Agric., Piracicaba* 25 (3/4), 1950 (95–114). 9 refs. [Port.e.] A.P.B.

A short summary of the plant-rearing methods used, with fairly detailed instructions on methods of propagating the following

species: Jatoba (*Hymenaea* sp.), Pau Pereira (*Platycyamus regnellii*), Tamboril (*Enterolobium timbouva*), *Grevillea robusta* and Carne de Vaca (?*Roupala brasiliensis*).

1096. KRIŠKA, S. Školkovanie sadeníc. **[Transplanting of nursery stock.]** *Pol'ana* 4 (6/7), 1948 (127–9). [Slovak.]

Includes a description (illustrated) of a planting spade, locally manufactured from a German pattern, which has proved labour-saving. The blade, *ca.* 50 cm. broad × 25–40 cm. long, is rectangular and flat, and has a foot bracket. The total weight is 5·2 kg.

1097. VERZILOV, V. F. Stimulyatorȳ rosta kak faktor, uskoryayushchi korneobrazovanie i rost peresazhennȳkh derev'ev. **[Growth stimulators accelerating root formation and growth in transplanted trees.]** *Zhurnal Obshchey Biologii, Moskva* 11 (2), 1950 (120–30). [Russ.] P.R.

Experiments made at the Timiryazev Institute of Plant Physiology in 1948 and 1949 indicate that growth substances can be highly effective in stimulating root production after transplanting. (1) *Tests with seedlings*: 2-year-old *Tilia americana*, lifted in spring 1948, were stood in solutions of heteroauxin or α-naphthylacetic acid for 24 hr. before lining out; some of these, and some previously untreated plants, were watered, after lining out, with a solution of heteroauxin. At the end of September both types of treated seedlings showed marked superiority in the increments of root volume (180–220%) and stem diameter (200–250%) as compared with controls (100%). The maximum root volume increment occurred in the plants not treated at transplanting time but watered every week after transplanting with a 0·001% solution of heteroauxin at a rate of 1 litre/plant. Differences in height growth were slight. These plants were grown on without further treatment during 1949. At the end of that year the treated plants continued in most cases to show better growth. The two most effective treatments appeared to be 0·001% heteroauxin applied (*a*) by soaking for 24 hr. before lining out, and by watering [weekly?] afterwards; or (*b*) only by watering [weekly?] after lining out. These treatments gave respectively 172 and 197% in root volume increment, 131 and 113% in stem diameter increment, and 245–169% in height increment, as compared with controls (100%).

Similar but less marked effects were obtained for 2-year-old seedlings of *Praxinus americana* and *Quercus robur* in trials which included puddling the roots with 0·001% heteroauxin in a clay/peat suspension of the consistency of thick cream, as well as the above-mentioned methods of application.

(2) *Adult trees*: 40-year-old Lime trees were lifted with a ball of earth of 1·7×1·7×0·85 m., all cut roots on the surface of the ball were painted with 0·001% heteroauxin in a clay/peat paste, and the ball was protected during transit by a special box. After replanting, the trees were copiously watered, and on the following day 50 litres per tree of 0·001% heteroauxin solution were poured along the junction of the ball and the fill of fertile soil used in the planting hole. Subsequently, but not earlier than 5 days after the watering with heteroauxin, the trees were given ordinary waterings when necessary. Including controls, about 400 trees were planted in Moscow in the spring of 1948, all of which grew, flowered and fruited normally. Treated trees had somewhat larger leaves than controls. A check was carried out in Sept. 1948, when, according to ocular estimates, the root systems of treated trees had made about twice the growth of the controls. Further observations in 1949 showed that the shoot growth of treated trees in that season amounted to 130–190% of that of controls.

Similar trials were also made with 18-year-old Lime trees. Treatment of the cut roots in the balls of earth was identical with that of the 40-year-old trees. On the day after replanting, each tree received 20 litres of a growth substance—in this case (*a*) 0·0001% 2,4-D, (*b*) 0·001% 2,4-D, (*c*) 0·001% heteroauxin, or (*d*) 0·0005% α-naphthylacetic acid. In the first growing season the greatest increases in shoot growth were given by (*c*), (*b*), (*d*) (147, 136 and 131%), and in diameter growth by (*a*), (*b*), (*d*) (427, 300 and 285%). The root systems of treated trees [no distinction is made between treatments] were 10 or more times the size [volume?] of those of the controls. Measurements for 1949 showed that the greatest increases in shoot growth occurred in trees watered with (*d*), (*b*) or (*a*), in that order, and the greatest diameter growth in trees watered with (*b*), (*a*) or (*d*), in that order.

23.27. Arboriculture

See also *For. Abstr.* 12 (Nos. 1113, 1126).

1098. YASHIRODA, K. **Dwarfed potted trees or bonsai.** *Brooklyn bot. Gdn. Rec.* (*n.s.*) 6 (2), 1950 (68–79).

1099. ARAN, S. Orta Anadolu süs bahçeciliği için ziynet ağaçlari temini. [**The provision of decorative trees for ornamental gardening in Central Anatolia.**] *Ankara Üniversitesi Ziraat Fakültesi Yayinlari* No. 2, 1948. pp. viii + 139 + 1 tbl. 29 refs. [Turk.g.]

Three factors have to be taken into account when choosing species for ornamental planting in steppe regions:—(1) ecological; the plants must be adaptable to the region, (2) utilitarian; in central Anatolia they must meet a demand for structural wood and fuel, give shade for livestock, provide pasture for bees, as well as protect the soil on steep slopes; and (3) aesthetic; the monotony of a treeless landscape needs relief. A study is made of some exotic species, most of which have been grown at the Botanical Institute in Ankara, and the distribution, ecology and morphology of some native species are examined and discussed. Three types of site are considered:—(1) high plateaux and slopes, (2) headwater valleys, and (3) broad river valleys. For (1) dense plantations are preferable. For (3) planting in groups and the use of recumbent and dwarf species are recommended. The species discussed are classified into (*a*) those suitable for planting in open spaces, and (*b*) those suitable for gardens and other confined areas.

23.3. *Afforestation*

See also *For. Abstr.* 12 (Nos. 1066–8, 1099).

1100. MACDONALD, J. A. B. **Afforestation of peat.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (43–7).

Summarizes the findings of a complete survey of each of the Commission's 330 peatland experiments, which will form the basis of a bulletin on the planting of peatlands to be published shortly.

1101. NIMMO, M. **Planting experiments on lowland heaths.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (48–50).

The problems peculiar to lowland *Calluna* heathland have been under investigation for many years at Wareham Forest, Dorset. The soils are leached sands of the Bagshot beds. Figures are given for the effects of Broom as a nurse for Sitka Spruce [cf. *For. Abstr.* 10 (No. 1817)]. Good results have also been obtained from a direct sowing of *Robinia* on prepared patches to which compost had been added. Many seedlings were 12–20 in. high at the end of the first year. This tree is being tried in the hope that it will continue the 'leguminous effect' for a longer period than broom. Two other leguminous species under small-scale trial are *Lupinus arboreus* and *Colutea arborescens*, both of which are more or less naturalized.

In 1932 an experiment was begun to test the Danish method of raising Sitka Spruce in a matrix of *Pinus mugo*. For over 10 years little benefit from the Pine nurse was visible, but with the closing of the Pine canopy the Spruce is showing greater response, averaging 33·7 in. high with 2·1-in. shoots and good-coloured foliage, compared with 17·6 in., 0·5 in. and yellow foliage in the control plot.

An experiment was laid down at Wareham in 1939 to compare normal planting of Corsican Pine (1 : 1 transplants on single furrow ploughing) and direct sowing of the same species on prepared patches with compost. The direct sowings now average 68·0 in. high with shoots 9·5 in., compared with 24·1 in. and 6·6 in. for normal planting. There were no blank patches in the sowings, whereas *ca.* 25% of the planting stock failed.

1102. La reconstitution des Landes de Gascogne. [**The rehabilitation of the landes of Gascony.**] *Cahiers des Ingénieurs agronomes, Paris* 4 (4), 1949. pp. 60. [F.]

A special number devoted to the problem of restoring the forests destroyed in the fires of 1948. Different writers review the silvicultural, social and economic aspects of the forest, and others the soils, insect pests and diseases.

1103. CAPPUCCINI, G. Il rimboschimento della conca aquilana. [**The afforestation of the Aquila basin.**] *Monti e Boschi* No. 3, 1950 (99–106). [It.]

The plateau of Aquila in the Abruzzi, with a mean altitude of 700 m. and almost surrounded by mountain slopes, has been afforested mainly with several species of indigenous Pines, but a

recent severe infestation of *Acantholyda nemoralis* has shown the importance of having an admixture of other species, the choice of which is discussed [cf. *For. Abstr.* 12 (No. 1611)]. *Abies cephalonica*, *Cedrus atlantica* and *Cupressus arizonica* show promise.

1104. GAEL', A. G. K obleseniyu peskov Verkhnego Dona. **[Afforestation of the Upper Don sands.]** *Pedology* 1949 (12), (718–22). 17 refs. [Russ.] A.P.B.

These sands, which are ancient alluvial terraces subjected to secondary erosion, fall into 3 groups:—(1) hillocky, wind-eroded, infertile, dry grey sands; (2) undulating light sandy loams, more fertile but little suited to bear agricultural crops; and (3) flat, medium to heavy sandy loams which, forming a transition belt between the clay-loam chernozem of the steppe and the sands proper, were much favoured in the past for agriculture, but suffer from moderate erosion as a result of over-cropping, and stand in need of shelterbelts. Recommendations are made for each of these groups. In group (1) it is chiefly the depressions between the hillocks that are suitable for afforestation; these already bear clumps of Birch and Aspen and could be afforested with Pine. Group (2), which occupies about 60% of the area of sand terraces on the left bank of the Don, is eminently suitable for afforestation with Pine, which already exists on a few thousand ha. as 40- to 70-year-old plantations. Owing to the smoother topography, mechanized methods could be employed. On the more eroded areas, blocks of forest should be established, and where agriculture is possible, shelterbelts 20–40 m. wide and not more than 100–150 m. apart. The group (3) sites should have shelterbelts of Pine, Oak and Birch, in 100-m. strips spaced up to 250 m. apart, with agricultural crops between. Altogether about 100,000 ha. of sands are available for afforestation in Voronezh Province and it is planned to afforest some 37,000 ha. in the period 1945–65.

1105. RAVITSKY, B. **The use of seedlings in afforestation.** *Forest, Palestine* No. 2, 1950 (13–5, *Suppl.* 3). [Heb.e.]

Some account of direct planting operations in Algiers, particularly in the Marga forest where, after direct sowings had failed, good results were achieved by planting out 2- to 3-month-old seedlings of *Pinus halepensis*, Cypress, and even *Cedrus atlantica*. September-sown seedlings should be 3–5 cm. high with 15- to 18-cm. roots when put out in spring, avoiding rainy days. In view of Israel's large afforestation programme and high labour costs, the author urges the adoption of direct planting on these lines for all species that can be directly sown. [Cf. *For. Abstr.* 10 (No. 1778); 12 (No. 1086).]

1106. DELEVOY, G. Notice sur les boisements d'altitude dans la région du Tanganyika. **[Suggestions for the afforestation of the uplands of the Tanganyika district of the Belgian Congo.]** *Bull. agric. Congo belge* 41 (2), 1950 (398–408). [F.flem.]

Includes detailed recommendations for species according to site factors.

1107. **[Afforestation of mining dumps.]** *Rep. For. Adm. Nigeria 1948–9*, 1950 (25).

An experiment is being made in the planting of over-burden dumps and tailings in the tin-mining areas on the Jos Plateau. Holes were prepared, and half a headload of compost put into each. *Eucalyptus rostrata* was planted and shows a high percentage of survival. It is too early yet to assess the results, but it seems clear that the plants would not grow without the compost.

1108. LIMSTROM, G. A., and MERZ, R. W. **Rehabilitation of lands stripped for coal in Ohio.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 113, 1949. pp. 41. 7 refs.

Includes data on: (1) the character and extent of strip-(opencast)-mined land in Ohio; (2) possible uses of strip-mined land; (3) forest planting and sowing experiments, with information on choice of species, effect of levelling, methods and season of planting, planting under Black Locust (*Robinia pseudoacacia*), and direct sowing studies; and (4) forest planting recommendations. [Cf. *For. Abstr.* 10 (No. 2578).]

1109. MONTIEL SANCHEZ, T. Defensa de márgenes. **[River bank protection.]** *Montes, Madrid* 6 (32), 1950 (188–93). [Span.]

Describes some mechanical methods used in Spain for the fixation of river banks, and recommends some Poplar species useful for riverside plantations. Typical costs and estimated revenue from Poplar plantations, such as those in the old river bed of the Pusa, are presented, assuming them to be managed on a

10-year rotation. [Cf. *For. Abstr.* 12 (Nos. 1631–3).]

1110. SUTHERLAND, M. **Survey of tree planting on an east coast hill farm.** *N.Z. J. Agric.* 79 (5), 1949 (465–7, 469, 471, 473–5, 477–9). A.P.B.

Detailed and illustrated account of the reforestation and stabilization, over a period of 40–50 years, of a deteriorating farm holding on hilly, unstable ground. Some 40 native and exotic species have been established both pure and in mixture, by empirical methods. Plantings of Willow (*Salix vitellina*, pure or with *S. fragilis*, also *S. babylonica* and *S. purpurea*) and of Poplar (chiefly mixed *Populus nigra*, *P. nigra* var. *italica* and *P. alba*), both widely spaced, have been highly successful on slipping ground. In general, mixed crops that include broadleaved species have produced the best forest soil and best conditions for natural regeneration; conifer mixtures have proved unsatisfactory (except *Chamaecyparis lawsoniana* with *Larix decidua*); and pure stands are best for timber production. Of Eucalypts, *E. sieberiana* has done exceptionally well and is regenerating naturally. Experience in local use of the various species raised is discussed.

23.5. *Underplanting. Nurses. Filling Gaps (Beating up)*

See also *For. Abstr.* 12 (No. 1101).

1111. **Underplanting.** *Rep. Sth. For. Exp. Sta. 1949*, 1950 (7–9).

The second-year results of a study of underplanting Scrub Oak with Loblolly and Slash Pine, show that both survival and growth of the Pines are greatly benefited by release (girdling or poisoning the hardwoods) immediately after planting. [Cf. *For. Abstr.* 10 (No. 2581).]

1112. **Works of improvement.** *Rep. For. Dep. Sarawak 1948*, 1950 (7–8).

An area of secondary forest was underplanted with a mixture of *Swietenia macrophylla*, *Gmelina arborea* and six *Shorea* spp. The two former were nursery plants, raised from seed and established in baskets [cf. *For. Abstr.* 10 (Nos. 1788, 1795)]. Lines were cut contourwise, 20 ft. apart, and seedlings planted 10 ft. apart in these lines. Once the seedlings were established, the overwood was removed by poison-girdling, to give the plants full light. The response was good, particularly with *Swietenia* and *Gmelina*. The *Shorea* spp. are less well adapted to this process, on account of their irregular seed production, brief seed viability, and sensitiveness to root disturbance, which means that they cannot readily be transplanted.

1113. ALMEIDA, C. R. MARQUES DE. O efeito das plantas de sombra nas culturas tropicais. [**The effect of shade trees on tropical crops.**] *An. Inst. Agron., Lisboa* 16, 1948–9 (91–9). 4 refs. [Port.f.]

Discusses the effects of crop shade trees on tropical soils, and gives the results of investigations of soil profiles in two coffee plantations in St. Thomas Island, one shaded and one not shaded. In the soils of shaded plantations acidification of the upper horizons was low, whereas in unshaded plantations a pH of 4–5 was found. The author concludes that the shade trees, by means of their deeper root systems and their litter, make available to the crops elements leached out of the upper soil horizons by rain.

23.6. *Care and Inspection of Regeneration in the Initial Stage of Establishment*

See also *For. Abstr.* 12 (Nos. 1057, 1111–2).

1114. BARNARD, R. C. **Linear regeneration sampling.** *Malay. Forester* 13 (3), 1950 (129–42). 5 refs.

A method of enumerating or sampling regeneration in the dense re-growth following the opening of the canopy in Malayan tropical rain forest has long been sought. Such sampling needs to be carried out before cleaning so that the best type of treatment may be determined; it should be inexpensive, within the capabilities of subordinate staff, and yield reliable information on the composition, distribution, development and competition status of the economic regeneration. The principle of recording the required information about the best established economic stem only in each sample unit area in a transect, as used in milliacre sampling, has been extended to larger sample units varying with the average size of the regeneration. Extensive trials have shown that this technique fulfils the above requirements, and details of procedure and

recording, with sample forms, are given and the possibility of its application to permanent sample plots methods is discussed. *From author's summary.*

1115. **Cottonwood planting.** *Rep. Sth. For. Exp. Sta. 1949*, 1950 (12–3).

The use of mechanical cultivation for eliminating harmful weed and climber growth in 1st-year Cottonwood [*Populus deltoides*] plantations in the Mississippi Delta, shows promising results. Planting strips at least 5 ft. wide must be prepared before machines can be used. The strips must have fairly flat surfaces with no large clods. For areas with an especially dense cover of climbers, a heavy fire-line plough has proved most effective, while farm disk-harrows can be used successfully for light grass or weed cover. Two disk cultivations between the rows, the first made in one direction only and the second including cross cultivation, proved satisfactory and cheaper than hoeing. Two diskings between rows, without cross cultivation were not satisfactory.

24. TENDING OF STANDS AND TREES

See also *For. Abstr.* 12
(Nos. 928, 1057, 1073, 1090).

24.3. *Opening of the Canopy. Release and Improvement Fellings (including Poisoning and Girdling)*

See also *For. Abstr.* 12
(Nos. 1057–8, 1111–2, 1558–9).

1116. Freese, F. Jr. **Pine growth doubled by improvement cutting.** *Paper Tr. J.* 131 (3), 1950 (34). P.R.

Shortleaf and Loblolly Pine responded equally well to release from overtopping hardwoods. Annual height growth averaged 8½ in. before treatment, 8 in. in the first year after release, and 16 in. in the second.

1117. Peevy, F. A. **How to control southern upland hardwoods with ammate.** Sth. For. Exp. Sta. [1949]. pp. 7.

A leaflet for the instruction of farmers etc.

1118. Read, R. A. **Relation between time of treatment and sprouting of poisoned trees.** *Science* 111 (2880), 1950 (264). [Sth. For. Exp. Sta., New Orleans.] O.R.S.

When poisoning *Diospyros virginiana* with ammonium sulphamate crystals [cf. *For. Abstr.* 11 (No. 1048)], trees were treated at 6 a.m., 4 p.m., and 8 p.m. in order to find whether mortality and coppicing were affected by the time of day at which the poison was applied. The most striking difference was in epicormic branching. Shoots were found on only 25% of saplings treated at 6 a.m., on 55% of those treated at 4 p.m., and on 67% of those treated at 8 p.m.

24.4. *Shelterbelts. Windbreaks*

See also *For. Abstr.* 12
(Nos. 927, 933–5, 940, 1066–8, 1104).

1119. Rodionov, A. D., and Ol'shanski, M. A. Gnezdovoy posev lesnykh polos vo Vsesoyuznom Selektsionno-Geneticheskom Institute. **[The 'nest' method of sowing shelterbelts at the All-Union Institute of Breeding and Genetics.]** *Agrobiologiya* 1949 (6), (123–30). [Russ.russ.] [Vsesoyuzny Selektsionno-Geneticheski Institut im. T. D. Lysenko, Odessa.] A.P.B.

Describes a trial of Lysenko's 'nest' method of direct sowing [see *For. Abstr.* 12 (Nos. 320–1)] of Oak for forest and shelterbelt plantations, made by the Lysenko All-Union Institute of Breeding and Genetics, Odessa, in spring 1949.

Acorns were stored over winter in trenches 1 m. wide and deep, in 7–9 layers each 1–2 acorns deep, between layers of sand, finely-sifted slag or earth. The trenches were not at first filled to the top, but with the onset of the severe frosts, 40–50 cm. of earth were used as a covering. Of the materials used, only earth retarded germination to a suitable degree (sprouts not exceeding 1–1·5 cm. long in mid-March). After lifting, which was not done until immediately before transport to the plantation site, the acorns were watered and packed in bags. On arrival, they were put into pits, watered again, and covered with earth until required. By each pit was made a small mound of mycorrhizal soil which was sprinkled over the acorns before sowing, which was done in mid-March. After sowing the Oak, the interspaces were sown to agricultural crops. The spring was droughty, and only 18·4 mm. of rain fell between sowing time and 8 June.

Some of the Oak came up in the first half of May, but the mass appearance of seedlings occurred towards mid-June. On 6 July there were on an average 4·6 seed-spots per 'nest' with seedlings, and the density was reasonably uniform. In the first half of this month the plants reached 14–16 cm. in height, with root systems 35–50 cm. deep. Seedlings sheltered by agricultural crops did as well as those on fallow, where weeding and soil loosening were necessary. Cover from such crops as winter wheat, rye, lucerne and oats, protects the young Oak from weed growth and the effects of dry steppe winds.

1120. KARASEV, G. M. Lesopolosy gnezdovogo sposoba poseva v zasushlivýkh stepyakh yuga Ukrainý. **[Shelterbelts sown by the 'nest' method in the droughty steppes of the southern Ukraine.]** *Agrobiologiya* 1949 (6), (131–5). [Russ.russ.] [Vsesoyuzný n.-i. Institut Gibridizatsii i Akklimatizatsii Zhivotnýkh, Askaniya Nova.] A.P.B.

Gives a preliminary report, along much the same lines as the preceding paper, on the direct sowing of 80 ha. of Oak shelterbelt at the Askaniya-Nova Research Institute for Animal Hybridization and Acclimatization. Here the best acorn-storage method [other methods unspecified] was stratification in trenches in alternate layers of 5 cm. each of acorns and sand. In spite of a droughty spring with high winds (4 dust storms occurred between late March and early May), the sowings, which were made on 23–27 March and 1–2 April between strips of various agricultural crops, proved in a check made in late June to have an average height of 13–18 cm., with an average of 21 Oak plants per 'nest', *ca.* 70% of the 'nests' showing 15 or more plants. Important conditions for success are: (1) Use of large, well filled acorns that are just beginning to sprout. (2) Sowing as early as possible, since later sowings come up at a time when the growing points of Oak are likely to be scorched by high soil temperatures. (3) A sowing depth of 5–8 cm., regarded as the optimum for S. Ukraine.

In the steppe, pests of both acorns and seedlings may be troublesome and it is reported that against beetles [not further specified] dusting with DDT and the use of poison baits (oil-cake poisoned with sodium arsenite solution) have proved highly effective.

1121. KABANOV, P. G. Posev lesnýkh polos gnezdovým sposobom na Yugo-Vostoke. **[Direct sowing of shelterbelts by the 'nest' method in the S.E. [of Russia].]** *Agrobiologiya* 1949 (6), (136–40). [Russ.] [Institut Zernovogo Khozyaystva Yugo-Vostoke SSSR, Saratov.] A.P.B.

Reports, in general terms, the initial success of Oak shelterbelt sowings made by this method in spring 1949 at various places in Saratov and Stalingrad Provinces, in spite of spring drought. The essential conditions for success appear to be high seed quality and early development of the root system while the soil moisture is still high.

An experiment on the effect of various agricultural crops grown in strips between the Oak, suggests that there is little difference, as regards mean height and mean number of leaves of the Oak seedlings, between proso millet, spring wheat, oats and fallow; but on the whole, proso millet is believed to be the most suitable for intercropping. In a trial in which the 'nests' were surrounded by continuous spring wheat or oats, the Oak grew as well as in the usual 'nest' sowings and needed scarcely any weeding.

It is stated that experiments by the Microbiological Institute show that treatment [no details] of acorns with *Azotobacter* (forest strain) and *Pseudomonas*, improved the root development of the resulting Oak seedlings. Such 'bacterized' plants also had greener leaves and a well developed shoot system. The favourable effect of inoculating field soils by puddling acorns with soil from Oak stands is enhanced by simultaneous treatment with *Azotobacter*. Treatment of *Caragana* seed with *Azotobacter*, *Pseudomonas* and nodule bacteria [separately or together?] gave increases in the length and number of roots and the leaf number per seedling. Treatment with nodule bacteria gave earlier nodule formation and more nodules per plant.

In notes on working technique it is mentioned that a few seeds of oats per Oak seed-spot will germinate rapidly and make efficient markers, so that subsequent agricultural operations will not trespass on the Oak 'nests'.

Some sowings have suffered from large-scale destruction of acorns by marmots, mice and hamsters; this has been most severe in sowings adjacent to fallow land. The article concludes with some notes comparing steppe, forest edge

and interior microclimates from observations in the 'Grachev Kust' forest, Balakov district, Saratov Province, where no natural forest exists, in order to emphasize the importance of the establishment of a forest environment for the maintenance of forests in the steppe.

1122. Cooney, E. A. **History of the Selwyn Plantation Board.** *N.Z. J. For.* 6 (1), 1949 (11–9). 1 ref.

The Board controls 17,780 acres of plantation reserves, set aside for the purpose in 1878, on the Canterbury plains. Its primary function is to provide shelter. Forest area has increased from 6,400 acres in 1910 to 12,848 acres in 1948. *Pinus radiata* and Douglas Fir are the two main species, and Eucalypt and Wattle stands are being converted to *P. radiata*. The Board's revenue is derived from its own resources, all net revenue being used for forestry purposes. With the exception of a small quantity of firewood and fencing, all forest produce is sold on royalty. Figures for output are given. The working plan provides for a forest area of 20,000 acres by 1983 by annual plantings of 430 acres. Revenue will be low during 1955–65, but from then on, if there are no major disasters, income should suffice to implement the Board's policy of sheltering thousands of acres of light land by gridding the area with narrow belts.

1123. Bailey, F. L. **The culture of Meyer lemon trees.** *N.Z. J. Agric.* 79 (3), 1949 (245–7, 249, 251–2). 3 refs. A.P.B.

Includes advice on the establishment of shelterbelts for the orchard. Deciduous trees are not entirely satisfactory for protecting evergreen species, but in exposed sites tall trees, such as Poplar, Pine or *Eucalyptus*, may be used in conjunction with bushy species such as *Bambusa vulgaris*, *Tecoma capensis* and *Acmena floribunda*. In sites which are not overexposed, *Cupressus lawsoniana* and *C. benthami* give excellent shelter up to a height of 20–25 ft. The latter species is more suitable for wetter soils. *Hakea saligna* has proved satisfactory in North Auckland. Permanent belts should be established at least 2 years before the young fruit trees are set out, but where this is not possible, temporary shelter can be provided by growing *Albizzia lophantha* (Brush Wattle). With direct sowing, the hedge usually reaches a height of 10–12 ft. within 2 years.

24.5. *Pruning*

See also *For. Abstr.* 12 (No. 1570).

1124. Glattfelder, C. F. **Is bud-pruning of forest trees practical?** *Pa. For. Wat.* 2 (4), 1950 (88–9, 96). 8 refs.

A short review of the literature on bud-pruning of Pines. [Cf. *For. Abstr.* 11 (No. 300).]

1125. Huey, B. M. **The profit in pruning Western White and Ponderosa Pine.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 85, 1950. pp. 6. 3 refs.

A comparison of yields of clear timber from butt logs of pruned and unpruned trees showed that pruning is profitable practice for both species; e.g. a pruned butt log of White Pine [*P. monticola*] having a 4-in. knotty core and harvested at 21 in. d.b.h., will yield $48.56 more per 1,000 bd. ft. after deducting pruning costs, than a similar unpruned log. In Ponderosa Pine the increase in net profit for a similar log would be $53.72.

1126. **Tree surgery.** *N.Z. J. Agric.* 79 (1), 1949 (41–4). A.P.B.

Methods of budding, grafting, pruning, dealing with wounds etc.

FOREST UTILIZATION. FOREST TECHNOLOGY

See also *For. Abstr.* 12 (Nos. 990, 1040).

1127. PANSHIN, A. J., HARRAR, E. S., BAKER, W. J., and PROCTOR, P. B. **Forest products: their sources, production and utilization.** McGraw-Hill Book Company, Inc., New York. 1950. pp. 549. Many refs. Price $6.00 (£2. 11*s*. 0*d*.).

A textbook containing sections on: (1) the economics of forest utilization, covering timber resources of the U.S.A., wood residues, and the relation of wood properties to utilization; (2) wood products (round timbers, mine and railway timbers, furniture, veneers and plywood, containers, shingles, wood flour, sawdust and shavings, fuel and minor products); (3) chemically derived products (pulp and paper, insulating materials, cellulose filaments and film, carbonization and destructive distillation, and saccharification) (4) derived and miscellaneous forest products (naval stores, syrup and sugar, tannins and dyes, wood in plastics, and minor forest products). There are a bibliography and numerous photographs, diagrams and tables.

1128. Årsberetning for 1949. [**Annual report for 1949.**] Norsk Treteknisk Institutt, Oslo. [1950]. pp. 11. [Nor.e.] P.R.

The first annual report of the Norwegian Institute of Wood Technology.

1129. **Research program 1950–1951.** *Program of work, U.S. For. Prod. Lab., Madison* 1950. pp. 76. P.R.

31. PROPERTIES AND ANATOMY OF WOOD. WOOD RESEARCH

1130. **Malaya. Scheme for pilot tests.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F50/FE/4*, 1950. pp. 10. P.R.

Includes instructions for the collection of material; disposal on arrival; sawing of logs; mechanical, physical and seasoning tests; amenability to preservative treatment; durability; starch tests; woodworking characteristics and nail-driving tests; and specimens of various forms.

31.0 *General Information on Woods*

See also *For. Abstr.* 12 (Nos. 897–8, 985, 987, 1014, 1031, 1042).

1131. **Specimen woods Nos. 174–6.** *Suppls.* to *Wood* 15 (6–8), 1950 (203–4; 239–40; 277–8).

Morabukea (*Mora gonggrijpii*); Mchenga (*Isoberlinia ?globifera*); and Mubura (*Parinari excelsa*).

1132. **[Colonial timbers.]** *Bois For. Trop.* No. 14, 1950 (141–8). [F.]

Ebiara (*Berlinia bracteosa*, *B. acuminata* and *B. heudelotiana*) and Ovoga (*Poga oleosa*).

1133. LAMB, G. N. **Foreign woods—origin, use, properties and nomenclature.** *Wood Prod.* 55 (6–8), 1950 (24, 26; 26–7; 26–7).

(*a*) Owewe (*Combretodendron africanum*), Agboin (*Piptadenia africana*), Parana Pine (*Araucaria angustifolia*) and Kauri Pine (*Agathis australis*).

(*b*) Kokrodua (*Afrormosia elata*), Kejaat (*Pterocarpus angolensis*), Amboyna (*P. indicus*), and English Yew (*Taxus baccata*).

(*c*) Kokko (*Albizzia lebbek*), Chickrassy (*Chikrassia tabularis*), and Mora (*Mora excelsa*).

1134. SCHMIDT, E. Überseeholzer Nr. 13, 17–19. [**Foreign woods. Nos. 13, 17–19.**] *Suppls.* to *Weltholzw.* 2 (1; 5–7), 1950. Each pp. 2. [G.] P.R.

Bossé (*Guarea cedrata*); Abura (*Mitragyna stipulosa* and *M. ciliata*); Zapatero (*Gossypiospermum* (*Casearia*) *praecox*); and Sipo-Mahogany (*Entandrophragma utile*).

1135. THOMAS, A. V. **Malayan timbers.** *Malay. Forester* 13 (2; 3), 1950 (84–90 + 1 photo; 158–63 + 2 photos)

Properties, defects, and uses of:—Bintangoi (*Calophyllum* spp.), Geronggang (*Cratoxylon* spp.), and Terentang (*Campnosperma* spp.); Jelutong (*Dyera costulata*) and Nyatoh (*Palaquium* spp., *Payena* spp.).

1136. LATHAM, B. **Hardwood survey. 1. The commercial timbers of Europe.** *Wood* 15 (6), 1950 (196–8).

1137. **Benamingen van houtsoorten. [Names of wood species.]** Central Normalisatiebureau, 's-Gravenhage, Standard No. *N*1015, 1941. pp. 79. [Du.] P.R.

Gives Dutch standard trade names, with alternative trade and botanical names, of 156 hardwood and softwood timbers.

1138. **Indian [Republic] standard classification of commercial timbers and their zonal distribution.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50/*FE* 9, 1950. pp. 25. P.R.

List of more than 500 timbers, classified geographically and according to their major uses, with botanical, trade, and local names. [Cf. *For. Abstr.* 10 (No. 1837.)]

1139. **Commercial and botanical nomenclature of some Thai trade timbers.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50 *FE* 5, 1950. pp. 5. P.R.

Compilation of 29 entries in *British Standards* 881 and 589, and *Provisional Supplement to B.S.* 881 and 589, 1946, of the British Standards Institution, with suggested additions. Another 17 Thai timbers, as yet not well known on the European markets, are listed (botanical species and proposed standard name).

1140. **Terminology. Indochina.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50 *FE* 8, 1950. pp. 2 + 2. P.R.

A list of 34 timbers (trade name suggested, scientific name, family, and use).

1141. WIMBUSH, S. H. **Catalogue of Kenya timbers.** Govt. Printer, Nairobi. 1950. pp. 69. Price 2*s*. 50*c*. P.R.

Over 100 species are described. Mechanical and physical properties are tabulated and indexes given for scientific, English, trade, and vernacular names.

1142. **List of Indonesian trade timbers.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50/*FE* 6, 1950. pp. 2. P.R.

List of 48 timbers (family, trade names, scientific name).

1143. TURNBULL, R. F. **The taxonomy, harvesting, processing and utilization of *Eucalyptus* trees in Australia.** *Econ. Bot.* 4 (2), 1950 (99–131). 12 refs.

Discusses logging methods and properties and uses (covering sawn, hewn, and round timber, veneers and plywood, pulp and paper, building boards, tanstuffs, firewood, oils, and honey production) of *Eucalyptus* spp., and includes tables showing strength groups of the principal species, and properties and uses of species classed by availability.

1144. **Properties of Australian timbers.** *For. Prod. News Lett. C.S.I.R. Aust.* Nos. 179 & 180, 1949 (4; 8).

Southern Blue Gum (*Eucalyptus globulus* and *E. bicostata*), and River Red Gum (*E. rostrata*).

31.1. *Structure. Anatomy. Identification*

See also *For. Abstr.* 12

(Nos. 956–7, 1210, 1232, 1327, 1331–3, 1337–40, 1362, 1364, 1411, 1498).

1145. VAROSSIEAU, W. W. **On the use of the electron microscope in wood anatomy.** *Repr.* from *Proceedings of the Conference on Electron Microscopy, Delft, 1949*, 1950 (107–10). [E.]

The structure of solid wood blocks was studied, employing a new replica technique developed by Nieuwenhuys in the Division for Electron Microscopy of the Technical Physics Department, Delft. The technique is as follows:—(*a*) An impression of a solid wood block is taken on a matrix of polyethylene, grade 20, at 115° C. and 2 atm. pressure. (*b*) A positive collodion replica is then made of the matrix. As this replica cannot be prepared thin enough to be used directly in the microscope, two more steps are necessary. (*c*) An aluminium film of about 20Å. thickness is evaporated *in vacuo* from all sides on the collodion print. To obtain a relief in the picture a gold manganin shadow cast is imposed on the aluminium film at an angle of 45°.

(*d*) The collodion is dissolved in the condensing vapor of amyl acetate.

Material so prepared and examined with the Delft electron microscope comprises: (1) Clear cut transverse and longitudinal surfaces of healthy Norway Spruce and Scots Pine. (2) Spruce samples, decayed for 3 months under laboratory conditions by *Coniophora cerebella* to a 23·3 to 32·3% loss in weight. (3) Cell-wall structure in the line of failure in Pine compressed parallel to the grain.

To date only unaltered wood has been examined, i.e. no chemical constituents (such as lignin) have been removed by the preparation technique.

Preliminary findings (shown in photographs) are that:—(1) While the electron microscope may have only a limited application in problems of wood identification (cell-wall structure being a promising field), it offers considerable possibilities in the study of decay. Cell walls of decayed wood show white areas with typical constrictions. These areas precede a local breakdown of the wall. As these features are not observed in normal or mechanically damaged wood, they seem to be typical for fungal attack. (2) Changes of structure observed in the line of failure of mechanically damaged wood show up as granular areas in the cell wall. These do not feature in micrographs of normal or decayed wood and therefore seem to be characteristic of mechanical damage. (3) Micrographs of normal, decayed, and mechanically damaged wood, show consistent differences of the kind noted above. Only further investigation can determine whether these differences are of diagnostic value or merely due to faulty interpretation.

1146. Rodrigues, J. M. Vianna. Notas preliminares sôbre um ensaio para identificação de madeiras pelo hidróxido de sódio (NaOH). **[Preliminary notes on a method of identifying woods by means of NaOH.]** *Publicação Serviço da Imprensa Universitária, Porto Alegre* No. 20, 1950. pp. 5. [Port.] [Instituto Tecnológico do Rio Grande do Sul.]

One gram of dry wood ground to sawdust, is placed in a test-tube and 5 c.c. of a 10% solution of NaOH is added. The reaction between the NaOH and the lignin in the wood causes an immediate rise in temperature, which is recorded on a Centigrade thermometer. The rise varies with different species, and it is believed that the process would be useful for identification. The rises in temperature of 28 species tested are recorded.

1147. Cozzo, D. Identificación de maderas por medio de fichas perforadas. **[Identification of timbers by means of punched cards.]** *Cienc. e Invest., B. Aires* 6 (4), 1950 (159–64). 18 refs. [Span.] [Museo Argentino de Ciencias Naturales 'Bernadino Rivadavia'.] A.P.B.

Outlines a modified system.

1148. Reno, J., and Kukachka, B. F. **Reno-Kukachka wood identification chart No. 1. Commercial hardwoods. Parts 1–3; 5–7.** *Wood, Chicago* 5 (1–3; 5–7), 1950 (25–7; 28–9; 22–3; 26–7; 26–7; 22–3). P.R.

[For Part 4 see *For. Abstr.* 12 (No. 355).] The present parts give tabular keys for:—(1) White and Red Oak [*Quercus* sections *Leucobalanus* and *Erythrobalanus*], Hickory and Pecan [*Carya* spp.]; (2) White, Red, Green and Oregon Ash [*Fraxinus americana, F. pennsylvanica, F.p.* var. *lanceolata*, and *F. oregona*], Rock or Cork Elm [*Ulmus thomasi*], and American or White Elm [*U. americana*]; (3) Slippery or Red Elm [*U. fulva*], Hackberry [*Celtis occidentalis*], Sugarberry [*C. laevigata*], and Sassafras [*S. albidum*]; (5) Cottonwood and Aspen [*Populus* spp.], Yellow Poplar [*Liriodendron tulipifera*], and Basswood [*Tilia* spp.], (6) Buckeye [*Aesculus* spp.], Black Gum and Tupelo [*Nyssa* spp.], and Maples [*Acer* spp.]; (7) Yellow and Sweet Birch [*Betula lutea, B. lenta*], Beech [*Fagus grandifolia*], and Sycamore [*Platanus occidentalis*].

1149. Greguss, P. **Xylotomic investigation of some uncommon tropical coniferous genera.** *Repr.* from *Acta Botanica, Szeged* 4 (1/6), 1949 (1–26 + 68 photos, 1 drawing, 51 dgms.) 19 refs. [E.] P.R.

Gives anatomical descriptions with microphotographs and diagrams, of 19 species of Pinaceae, Taxodiaceae, Cupressaceae, Araucariaceae, Taxaceae and Podocarpaceae, being the second of 3 articles covering all coniferous spp. These are shortly to be published under the title *Xylotomic Identification of the Conifers.*

1150. Yu, C. H. **Anatomy of six coniferous woods of Sikang.** *Bot. Bull. Acad. sinica* 3 (4), 1949 (150–2). 3 refs

Abies georgei, Pinus armandi, P. yunnanensis, Larix potaninii, Picea likiangensis, P. brachytyla.

1151. BANNAN, M. W. **Abnormal xylem rays in *Chamaecyparis*.** *Amer. J. Bot.* 37 (3), 1950 (232–7). 7 refs. [University of Toronto, Ont.] O.B.D.

1152. BANNAN, M. W., and WHALLEY, B. E. **The elongation of fusiform cambial cells in *Chamaecyparis*.** *Canad. J. Res.* 28*C* (3), 1950 (341–55). 19 refs. P.R.

Studies of the secondary xylem and phloem indicated that in the first phase, sister fusiform initials usually elongated rapidly. After this first phase, rate and amount of extension varied, often proceeding in a somewhat periodic manner. Growth appeared to be apical, 'intrusive' in the sense that the elongating tips thrust between other cells. No evidence was found to support the theory of simultaneous elongation of considerable portions of adjoining walls by 'symplastic' growth.

1153. ARTSCHWAGER, E. **The time factor in the differentiation of secondary xylem and phloem in Pecan.** *Amer. J. Bot.* 37 (1), 1950 (15–24). 10 refs. [U.S.D.A. Field Station, State College, New Mexico.] O.B.D.

1154. PAOLIS, D. DE. Ciclo di accrescimento e differenziazione delle gemme in piante perenni nel territorio di Bari. 5. L'evoluzione della cerchia legnosa in *Rhamnus alaternus* L. dal Dicembre 1946 al Marzo 1949. [**Growth cycle and bud differentiation in perennial plants in the neighbourhood of Bari. 5. Development of the annual ring in *Rhamnus alaternus* Dec. 1946 to March 1949.**] *Nuovo G. bot. ital.* (*n.s.*) 56 (3), 1949 (328–38). 3 refs. [It.it.e.] A.P.B.

Cf. *For. Abstr.* 11 (Nos. 200–1, 1853).

1155. COZZO, D. Estudio anatomico sobre la posición sistemática de algunos géneros argentinos de Leguminosas Papilionoideas. [**Anatomical study of the systematic position of some Argentine genera of the Papilionatae (Leguminosae).**] *Repr.* from *Lilloa* 16, 1949 (97–124 + 7 plates). 13 refs. [Span.e.] [II Congreso Sudamericano de Botánica, Tucuman.] X.

The following tribes were studied: Sophoreae, Genisteae, Galegeae, Trifoliae, Hedysareae, Dalbergieae and Phaseoleae. The Genisteae and the Dalbergieae appear to be two homogeneous and natural groups forming the extremes of the same line of phylogenetic evolution. The other tribes are to a variable extent heterogeneous, and can, by a segregation of the genera, be reduced as follows: the genera *Gourliea*, *Cascaronia* and *Poecilanthe* must be placed in the Dalbergieae; *Ramorinoa* finds its natural position in Dalbergieae Pterocarpiniae. *Sophora* and *Styphonolobium* are not synonymous, but probably form two independent entities with a very close relationship to the Galegeae, a tribe in which *Sophora* at least would have to be included. *Ateleia*, *Ferreirea*, *Myrocarpus*, *Myroxylon* and *Sweetia* are separated from the tribe Sophoreae and placed in the Dalbergieae. *From author's summary.*

1156. INGLE, H. D., and DADSWELL, H. E. **Project W.S.11. Anatomy of the timbers of the south-west Pacific area. Part IV. Myrtaceae. Summary report No. 4; and sub-projects WS. 1–1 to WS. 1–3: Wood anatomy of Australian timbers and methods for their identification: family Myrtaceae.** Div. For. Prod., Commonw. sci. indust. Res. Organ. Aust. 1950. pp. 52 + vi + 55 photos, 5 tbls., 1 map. 20 refs. P.R.

The anatomical features of each of 26 genera have been summarized and the results set out in tabular form. From these a grouping of the genera of the family has been made; anatomical variations in *Eugenia* (*sensu lato*) are given special mention. The affinities of the genera with those of the New World are discussed and also the anatomical variations between the Myrtaceae and the closely allied Lecythidaceae. *From authors' summary.*

1157. BISSET, I. J. W., and DADSWELL, H. E. **The variation of fibre length within one tree of *Eucalyptus regnans*, F.v.M.** *Aust. For.* 13 (2), 1949 (1950), (86–96). 15 refs.

[Cf. *For. Abstr.* 11 (No. 2743).] In an investigation of fibre lengths within one tree of *Eucalyptus regnans*, 50 years old and 172 ft. high, particular attention was paid to the variation throughout a growth ring and it has been found that the fibres of the last-formed late wood were consistently longer than those of the early wood. The fibre length in the late wood varied throughout the tree from 0·6 mm. in the ring next to the pith at all levels to 1·35

mm. in the outermost rings at the 50 ft. level. At all levels there was a rapid increase in length of both early- and late-wood fibres from the centre of the tree outwards for approximately 10 growth rings, after which a more or less constant value was reached in each case. The need for care in selecting material for comparative fibre length measurements and in recording results has been stressed. *From authors' summary.*

1158. **Fibre structure and the properties of wood.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 180, 1950 (2–5).

1159. PILLOW, M. Y. **Occurrence of gelatinous fibers and their effect upon properties of hardwood species.** *Prepr. U.S. For. Prod. Res. Soc.* No. 117, 1950. pp. 11. 11 refs. P.R.

Summarizes the results of recent research (U.S.A. and British Commonwealth) on gelatinous fibres and their effects. [Cf. *For. Abstr.* 12 (No. 1210).]

1160. LÜDTKE, M. Zur Morphologie und Chemie der pflanzlichen Faserzellwand. **[Morphology and chemistry of the cell wall of plant fibres.]** *Holzforschung, Berlin* 4 (3/4), 1950 (65–78). 97 refs. [G.] P.R.

A general account of the subject, quoting mainly European work. Includes sections on special phenomena (spherical swelling, permeability, strength), and on foreign substances.

1161. SEN, J., and BANERJEE, B. K. **X-ray investigation on the change in orientation of cellulose in sound and infected tracheids of Chir (*Pinus longifolia*).** *Science* 111 (2876), 1950 (151). 4 refs. [University College of Science, Calcutta, and Indian Association for the Cultivation of Science, Calcutta.] O.R.S.

It was shown that the degree of disorientation of cellulose crystallites from the tracheal axis is much greater in the case of a sound sample of *P. longifolia* sapwood than in that of a sample infected by *Lenzites striata*. This clearly demonstrates that the cellulose orientation can be changed by means of enzymatic hydrolysis.

1162. PRESTON, R. D., and SINGH, K. **The fine structure of Bamboo fibres. I. Optical properties and X-ray data.** *J. exp. Bot.* 1 (2), 1950 (214–26 + 1 plate). 19 refs. [University of Leeds.] O.B.D.

A complete picture of cellulose-chain orientation in a wide variety of Bamboo fibres is presented. Material studied consisted mainly of mature stems of *Dendrocalamus strictus, D. longispathus, Melocanna bambusoides* and *Bambusa arundinacea*. The wall of Bamboo fibres is many-layered. An outermost, thin layer is composed of cellulose chains making an angle of 35° to cell length and this is followed by other, inner layers where the angle steadily decreases from outer to inner layers, first to about 20° and then to about 10°. These layers are separated by thicker layers, dark in transverse section between crossed nicols, in which the angle is seldom more than 5–6°. These are average figures. The results show most clearly that each angle, θ, varies with the fibre length, L, in such a way that the longer cells have steeper spirals in harmony with a relation of the type $L = A + B \cot \theta$ already proposed for wood tracheids. *From authors' summary.*

31.2. *Physical Properties*

See also *For. Abstr.* 12 (Nos. 1158–60, 1525).

1163. **Paper on the standardization of timber tests. [Methods used by the Research Institute of Indochina.]** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F50/FE/25*, 1950. pp. 5. P.R.

1164. **Testing methods in Indonesia.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F50/FE/7*, 1950. pp. 3. P.R.

31.22. Relation to Water, Air, Gases

See also *For. Abstr.* 12 (Nos. 1167–8, 1210).

1165. COCKRELL, R. A. **Further observations on longitudinal shrinkage of softwoods.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (455–9). 8 refs. [School of Forestry, University of California, Berkeley, California.] P.R.

Results of experiments on the longitudinal shrinkage of *Pinus ponderosa*, *Abies concolor*, *Pinus echinata*, *P. palustris*, *P. radiata*, *P. taeda*, and *Pseudotsuga taxifolia*, confirm earlier results on *P. ponderosa* [see *For. Abstr.* 9 (No. 2254)]. Summerwood strips elongate slightly in drying from green to air-dry, but become shorter during further drying to oven-dry. Springwood strips normally shorten in drying from green to air-dry and shorten appreciably in drying to oven-dry. Measurements on blocks showing growth rings of different widths indicate that wide growth rings or rapid growth do not cause excessive longitudinal shrinkage in the species studied.

1166. NOWAK, A. Die Quellungsvorgänge im Holz. [**The swelling processes in wood.**] *Mitt. öst. Ges. Holzforsch.* 2 (2), 1950 (9–12). 18 refs. [G.] P.R.

Tests were made to find the swelling effect of 21 organic liquids on Beech, as shown by the maximum swelling volume, speed of swelling and the relationship between the swelling and the amount of liquid taken up. Results, compared with those for water, are given in a graph and tables. Formulae for calculating the maximum volume swelling of the wood and the fibre saturation point are given. The calculated fibre saturation point for 15 species agrees fairly well with that found experimentally, except in the case of Lime, which shows abnormal swelling behaviour [cf. *For. Abstr.* 11 (No. 2737)]. Further experiments show that loss of wood strength is related to the degree of swelling and to the viscosity of the swelling liquid.

31.23. Weight. Specific Gravity

See also *For. Abstr.* 12
(Nos. 1232, 1323, 1336).

1167. LINDGREN, R. M. **Density and moisture relations in Slash Pine wood.** *Sth. For. Note Sth. For. Exp. Sta.* No. 63, 1949 (1–2).

A study of pulpwood from a 22-year-old Louisiana *Pinus caribaea* plantation showed that:—(1) specific gravity of wood increased steadily with age of bolt (i.e. towards butt of tree); (2) in bolts of the same age (*ca.* same height in tree), sp. gr. was not correlated with width of growth rings; (3) moisture content increased with height in tree and decreased as sp. gr. and age of bolt increased. In this study, rate of growth varied between 4 and 12 rings/in. and thus did not represent any very fast or very slow grown material.

1168. HUGHES, R. V., and MACKNEY, A. W. **Density and moisture content of New Zealand *Pinus radiata* D. Don.** *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 3, 1949 (387–407). 7 refs. P.R.

Disks taken at 3 levels from three groups, totalling 210 trees, were collected at different seasons from a site class 2 area in North Island planted in 1925. The results are illustrated in the graphs and tables. Basic density varied significantly with season, the lowest value being obtained in the season of maximum growth. Green density tended to lower values for less vigorous trees. The over-all mean values were: basic density 23·55 lb./cu. ft., green density 61·0 lb./cu. ft., moisture content 161%. Within-log basic density increased from pith to sap and from top to butt. Green density rose sharply to a point *ca.* 25% of the tree volume from the pith, and thereafter rose slowly to a maximum of 67 lb./cu. ft. Moisture content rose to a maximum at a distance of 20% by volume from the pith, after which it decreased. [Cf. *For. Abstr.* 10 (No. 1868).]

31.27. Mechanical Strength

See also *For. Abstr.* 12
(No. 1180, 1219, 1276–8, 1408, 1422, 1432, 1440, 1525, 1530–2, 1535–6).

1169. ALEXANDER, J. B. **Basic stresses for wood.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (344–51). [Forest Products Laboratories of Canada, Vancouver.] P.R.

Basic stresses for western Canadian softwood species are given, and their application to squared timbers of solid wood, joists, planks, beams, stringers and posts, is discussed. Average strength properties, as determined by extensive laboratory tests, have been reduced by applying appropriate factors for variability and long-term loading and a safety factor. By applying a further 'grade factor' based on loss of strength resulting from defects allowed within a grade, working or design stresses are obtained. A table showing basic stresses for the species covered, illustrations showing the variation in strength throughout the tree in

Douglas Fir, and data on the relationship between basic stress and duration of maximum load, are included. *From author's summary.*

1170. REECE, P. O. **Determination of working stresses.** *Construct. Res. Bull. Timb. Developm. Ass., Lond.* No. 6, [1950]. pp. 20. 15 refs. I.F.B.

Definitions are given of specific gravity, moisture and equilibrium moisture content, slope of grain, knots, shakes, wane and rate of growth, and the effect of these factors on the strength ratio is discussed. The allowance for the duration of stress, and the increase for the drying effect in small timbers and for multiple members, are given.

1171. HEARMON, R. F. S. **The effect of sustained bending loads on the Young's modulus of wood.** *Proceedings of the International Rheological Congress, Delft* No. 2, 1948 (247–51). 3 refs. L.S.

It has been found that there is a small effect of sustained loading on the 'instantaneous' Young's modulus, the magnitude of this effect depending on the relative humidity to which the wood is conditioned. The research was done with specimens of Beech and Douglas Fir.

1172. DIETZ, A. G. H. **Short-time creep tests on Douglas Fir.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (352–60). [Massachusetts Institute of Technology, Cambridge, Mass.] P.R.

Tests were made with carefully matched specimens to determine the creep behaviour of wood, over a range of stresses, in direct compression and tension and in bending. Results, shown in graphs, suggest that in direct compression creep rates are very low below the proportional limit, that they are low in direct tension, and that bending tension and compression creep rates are also low. The continuing deflection of beams under load may be caused by shear creep.

1173. SMITH, L. G. **Program for testing wood poles to determine allowable fiber stresses.** *Bull. Amer. Soc. Test. Mater.* No. 160, 1949 (32–5). D.S.I.R.

Inconsistencies in the method of rating various species of poles in the U.S.A. (the older species being, as a rule, rated more conservatively than the newer ones), result in unnecessary factors of safety, which increasingly raise costs. In order to obtain a more accurate evaluation of the strength of poles, a special subcommittee has been formed by the A.S.T.M. to make tests, and more specifically: (1) to determine the adequacies of two tentative testing methods (the cantilever and the machine method) and to establish the correlation factor between them; (2) to ensure that the methods may be used for any species and any type of treatment; (3) to check the present values of maximum allowable fibre stresses; and (4) to establish a correlation between fibre stresses at time of rupture of full-sized poles and the moduli of rupture of small clear specimens.

1174. ORMAN, H. R. **Strength properties of some Kauris of the south-west Pacific with special reference to Fijian Kauri** [*Agathis vitiensis*]. *N.Z. J. For.* 6 (1), 1949 (55–9). 4 refs.

Tabulates properties of *A. vitiensis*, *A. australis*, and *A. robusta*.

31.3. *Chemical Properties*

See also *For. Abstr.* 12 (Nos. 1146, 1199–1200, 1209, 1317 *et seq.*, 1572).

1175. **Composition of tropical woods. Navy contract No. NgoNR-89000 NR033–320.** *Proj. Inst. Paper Chem.* No. 1477, 1950. pp. 65 + 16. 30 refs. P.R.

Quantitative analyses were carried out on composite samples of *Tabebuia guayacan*, *Pseudosamanea guachapele*, *Ocotea rubra*, *Manilkara bidentata* (from Puerto Rico and Surinam), *Cordia alliodora*, *Hymenaea courbaril*, and *Licaria cayennensis*, to supplement physical studies undertaken at the Yale School of Forestry [cf. *For. Abstr.* 11 (Nos. 1074, 1863); 12 (No. 337)]. The data include: extractives, ash, N, acetyl, uronic acid, xylan, tannin, lignin, methoxyl, hemicelluloses and α-cellulose. Only in two of the woods did the total extractive content exceed 10%. The xylan (pentosan) content was relatively low in most instances. The lignin content of four of the woods was unusually high and in several instances the methoxyl content of such lignin fractions was considerably below that found in the lignins of American angiosperms. The α-cellulose content was high. The acetyl values were relatively low.

1176. BLAND, D. E. **The chemistry of Eucalypt woods.** *Proc. Aust. Pulp Pap. Ind.*

tech. Ass. 3, 1949 (408–31). 35 refs. [Division of Forest Products, C.S.I.R.] P.R.

Discusses generally the chemical composition of wood and gives a survey of the field of the known chemistry of Eucalypt woods. *From author's summary.*

1177. MARK, H. F. **Submicroscopic structure of wood constituents.** *Tappi* 32 (3), 1949 (108–9). L.S.

Discusses the problem from the standpoint of recent research work. Stresses the importance of the effect of the presence of carboxyl and aldehyde groups in glucose residues as well as the not yet elucidated role of other bonds appearing in native cellulose. Classifies the arrangement of individual macromolecules of cellulose into: amorphous or disordered, crystallized or completely ordered, and mesomorphous, and gives the following methods for evaluating how much of a cellulose sample is in each category: (1) X-ray diagrams, (2) specific gravity of the material, (3) rate of exchange of cellulose with D_2O, and (4) oxidation of glucose residues obtained by hydrolysis of cellulose chains.

1178. HECHLER, G. Die Einwirkung von Nitriersäuregemischen auf Hölzer. [**Action of nitrating acid mixtures on wood.**] *Holzforschung, Berlin* 4 (2), 1950 (33–44). 11 refs. [G.g.] P.R.

Results are given of testing the yields, N content, stability values, methoxyl content and solubilities of the products of treating straw, Beech wood, and Fir wood with various nitrating acid mixtures. The effect of temperature and of methoxyl content on nitration was tested. The woods were subjected to preliminary hydrolysis, delignification and alkali pretreatment. The nitration products were de-nitrated by means of an alcoholic solution of $(NH_4)_2 SO_4$ and the de-nitrated products were tested.

1179. KORCHEMKIN, F. I. **Methylated substances contained in the cambial sap of Pine [*Pinus sylvestris*].** *Transl. For. Prod. Aust.* 1950. pp. 4. 3 refs. Transl. by M. Slade from *Biokhimiya* 14 (3), 1949 (256–8). [*For. Abstr.* 11 (No. 1108).]

1180. KLAUDITZ, W. Über die biologisch-chemisch-mechanische Wirkung des Lignins in Laubhölzern. [**The biological-chemical-mechanical effect of lignin in hardwoods.**] *Abstr.* in *Angew. Chem.* 61 (11), 1949 (451). [G.] D.S.I.R.

It has been found that lignin and hemicellulose do not contribute towards the development of the tensile strength of wood, as a prepared lignin-free 'wood' with low hemicellulose content has a substantially higher tensile strength than normal wood. After testing the mechanical properties of Beech wood freed from lignin without damaging the cellular structure, it has been suggested that lignin is essentially a supporting structural material and that its special biological function is to endow wood with the necessary strength when wet.

1181. FREUDENBERG, K. Über die Entstehung des Lignins und den Verholzungsvorgang. [**On the formation of lignin and the lignification process.**] *Abstr.* in *Papier, Darmstadt* 3 (13/14), 1949 (260–1). [G.] L.S.

When treating a diluted aqueous solution of coniferyl alcohol at pH 7 and under vigorous aeration with phenoldehydrase obtained from fungi, an amorphous bright material is obtained which is indistinguishable from the genuine Spruce lignin. On treatment with dilute acid, this yields an insoluble product which is identical with cuproxam lignin. A theory of the lignification process is suggested.

1182. CHUDAKOV, M. I. **Preparation of natural lignin from destructively decomposed wood.** *Transl. For. Prod. Aust.* 1950. pp. 11. 14 refs. Transl. by M. Slade from *Zhurnal prikladnoy Khimii, Moscow* 22 (4), 1949 (392–9). P.R.

Results of a chemical analysis of sound and decayed wood of *Pinus koraiensis* are tabulated. Lignin obtained from decayed wood by extraction with organic solvents, contained more methoxyls and H, and less C, than acid lignin. An empirical formula for this lignin is presented.

1183. BELL, A., and WRIGHT, G. F. **The extraction of Birch lignins with acetic acid.** *J. Amer. chem. Soc.* 72 (4), 1950 (1495–9). 14 refs. [McGill University and University of Toronto.] O.R.S.

Glacial acetic acid proved a good extraction medium for the removal of lignin from *Betula lutea.* A lignin-carbohydrate compound was isolated. Most extraction processes involved a

hydrolysis of this complex into isolated lignin and carbohydrate. The carbohydrate material is partly *d*-xylose. *From authors' summary.*

1184. ENKVIST, T., and MOILANEN, M. Äthanolamin-Sulfhydrat als Reagens für die Auslösung von Lignin aus Fichtenholz. **[Ethanolamine saturated with hydrogen sulphide as a reagent for dissolving lignin from Spruce wood.]** *Svensk PappTidn.* 52 (23), 1949 (587–8). 8 refs. [G.e.sw.] [Svenska Träforskningsinstitut.] P.R.

This reagent dissolves most of the lignin from wood at 100° C.; it dissolves wood polyoses much less than monoethanolamine or ethyl diamine without H_2S. The dissolved lignin seems to combine with a considerable amount of the ethanolamine and to lose part of the Me from the methoxyl groups.

1185. ENKVIST, T., MOILANEN, M., and ALFREDSSON, B. Studien über die Ausbeute und die Reaktionsgeschwindigkeit bei der Bildung von Schwefellignin aus Fichtenholz. **[Yield and reaction velocity in the formation of thiolignin from Spruce wood.]** *Medd. svenska TräforsknInst. (Träkem. PappTekn.)* No. 48, 1949. pp. 9. 15 refs. [G.e.sw.] P.R.

The use of large amounts of H_2S in aqueous solution does not increase the yield of thiolignin, irrespective of the previous history of the wood. Better yields are obtained if the reaction time is prolonged or the temperature raised. The yield of thiolignin from Spruce wood and H_2S, increases up to pH 8·5, and remains fairly constant above this value. Lignin from cooks of Spruce wood with H_2S at pH 7 and temperatures above 100° melts and flows out in the lumina of the cells. *From authors' summary.*

1186. ENKVIST, T., MOILANEN, M., and ALFREDSSON, B. **Studies on the yield and speed of reaction in the formation of thiolignin from Spruce wood.** *Transl. For. Prod. Aust.* 1950. pp. 14. 15 refs. Transl. by G. Schwerin from *Svensk PappTidn.* 52, 1949 (517–25). [See preceding abstract.]

1187. MARKHAM, A. E., PENISTON, Q. P., and MCCARTHY, J. L. **Lignin. III. Fractional precipitation of barium lignin sulfonates from water by ethanol.** *J. Amer. chem. Soc.* 71 (11), 1949 (3599–601). 12 refs. [Department of Chemistry and Chemical Engineering, University of Washington.] O.R.S.

1188. MITCHELL, R. L., and RITTER, G. J. **Galactan in Western Larch wood.** *Rep. U.S. For. Prod. Lab., Madison* No. R1771, 1950. pp. 5 + 3 tbls. 7 refs. P.R.

Galactan in the lateral roots of virgin trees of *Larix occidentalis* ranged from *ca.* 11 to 23%, based on the weight of the oven-dry wood. Slabwood from virgin-growth butt logs contained *ca.* 14% galactan; from middle logs, 4·2 to 10%; from top logs, *ca.* 5%. Fire-killed virgin trees had the following contents of galactan: butt logs 9–16%, middle logs 6·6–12·1%, top logs 6·6–7·8%. The respective figures for stand thinnings are: butt logs 3·8–5·3%, middle logs 2·1–3·5%, top logs 2·2–3·1% galactan. *From authors' summary.*

1189. RALPH, C. S., and WHITE, D. E. **Betulic acid from *Syncarpia laurifolia* Tenn.** *Journal of the Chemical Society, London* Dec., 1949 (3433–4). [University of Sydney.] O.R.S.

1190. ERDTMAN, H., and RENNERFELT, E. **Fungicidal properties of some constituents of the heartwood of *Tetraclinis articulata* (Vahl) Masters.** *Repr.* from *Acta chemica scandinavica, Copenhagen* 3, 1949 (906–11). 10 refs. [E.e.] P.R.

Laboratory investigation into the toxicity to wood-destroying fungi of thymol and three substances (carvacrol, hydrothymoquinone, thymoquinone) occurring in the wood of *Tetraclinis*. Thymoquinone is more toxic than hydrothymoquinone, which is approximately as active as phenol. The simple phenols, thymol and carvacrol, are more efficient fungicides than hydrothymoquinone. *From authors' summary.* [Cf. *For. Abstr.* 12 (No. 390); 11 (No. 2789–91); 10 (No. 1899).]

1191. NUNN, J. R., and RAPSON, W. P. **The phenolic resin of the wood of *Chlorophora excelsa* (Benth. and Hook f.).** *Journal of the Chemical Society, London* Dec., 1949 (3151–5). [National Chemical Laboratory, Pretoria.] O.R.S.

1192. KING, F. E., and GRUNDON, M. F. **The constitution of chlorophorin, a constituent of Iroko, the timber of *Chlorophora excelsa*. Part 1.** *Journal of the*

Chemical Society, London Dec., 1949 (3348–52). [Dyson Perrins Laboratory, Oxford University.] O.R.S.

1193. [Langelez, A.] Dermatoses du Kambala. [**Dermatitis caused by Iroko (*Chlorophora excelsa*).** *Rev. Bois Appl.* 5 (6), 1950 (41). [F.]

The effect of sawdust from Iroko on the skin, eyes and lungs is described. The greatest danger is during sandpapering, when large quantities of fine active particles are released; large pieces of the timber are harmless. Preventive methods suggested are a reliable system of removing the dust, and the use of protective clothing, goggles, and cream.

1194. Warren, H. V., and Delavault, R. E. **Gold and silver content of some trees and horsetails in British Columbia.** *Bulletin of the Geological Society of America, Baltimore* 61 (2), 1950 (123–8). 6 refs. L.S.

Trees and lesser plants growing in areas where there are good rock exposures and no silver mineralization is known, were found to contain from 0·1 to 1·4 p.p.m. of Ag. In negative gold areas, trees and lesser plants usually carry less than 0·0025 p.p.m. of Au. Air-dried plant material above ground known to be auriferous, contains as much as 0·02 p.p.m. of Au in some common trees (*Pseudotsuga taxifolia, Juniperus* sp., *Populus tremuloides, Salix* sp.). [Cf. *For. Abstr.* 10 (No. 48).]

31.4. *Durability. Decomposition*

31.42. Attack by Plant Organisms

See also *For. Abstr.* 12 (Nos. 1034, 1182, 1190, 1220–1, 1289, 1372–7, 1567–9).

1195. Orłoś, H. Grzyby szkodliwe w budynkach i na składach drewna. [**Harmful fungi in buildings and timber depots.**] *Wydaw. pomocn. tech.-gosp. (Ser. B) Inst. Bad. Leśn.* No. 24, 1950. pp. 76. [Pol.]

A book written in the first place for sawmill staff and dealing with the main species of fungi (house, timber-depot, and blue-staining), their control, and various fungicides. A list of 12 books is appended.

1196. Findlay, W. P. K. **Decay of wood by fungi—3.** *Timber News* 58 (2134), 1950 (332–3).

Contains general information on natural durability of woods, particularly on their resistance to fungal decay. The variation in durability within the heartwood of a single log is stressed; also the rôle played by parasitic fungi which are immune to extractives.

1197. Southam, C. M., and Ehrlich, J. **Etiology of some sap rots of Western Red Cedar poles.** *Phytopathology* 40 (5), 1950 (439–44). 5 refs. [University of Idaho, Moscow, Idaho.]

Fungi associated with the sap rots of *Thuja plicata* poles were isolated and cultured. Both field observations and experimental data indicate that the brown cubical sap rot known as 'golden glow' is caused by *Ptychogaster rubescens* (*Polyporus guttulatus*). *Coniophora puteana* and *C. arida* cause the more familiar brown cubical rots. *C. olivacea* and *C. olivascens* were found in association with 'golden glow' and *Paxillus panuoides* with brown rot, but an etiologic relationship was not proved. *Poria vaillantii* decays the sapwood slowly, causing only a slight darkening at first. *From authors' summary.*

1198. Lohwag, K. Bienenwabenfäule, hervorgerufen durch *Phellinus nigrolimitatus* (Romell) B. et G. [**Honeycomb rot caused by *Phellinus nigrolimitatus*.**] *Mitt. öst. Ges. Holzforsch.* 2 (3), 1950 (22–4). 9 refs. [G.g.] P.R.

This fungus, which is described in detail, occurs widely in the higher regions of the Alps, and causes the little known 'honeycomb' rot in Spruce wood. The 'honeycomb cells' in the woody tissues are filled with white (degraded) fibres. The enzymes of the fungus dissolve the cell walls or else degrade them to cellulose. The fungus also attacks Pine, Fir and *Thuja* (in America *Larix occidentalis, Picea engelmanni, Pinus contorta, P. ponderosa, Pseudotsuga taxifolia, Tsuga heterophylla* and *T. mertensiana*).

1199. Day, W. C., Pelczar, M. J. Jr., and Gottlieb, S. **The biological degradation of lignin. I. Utilization of lignin by fungi.** *Arch. Biochem.* 23 (3), 1949 (360–9). 9 refs. [University of Maryland, College Park.] O.R.S.

Six cultures were grown for a prolonged period in a lignin/glucose medium, the glucose content being gradually diminished to zero. Thus two cultures (*Polyporus abietinus* and *Poria subacida*) were obtained, which consistently produced an appreciable amount of growth on a solid or liquid medium in which lignin was the limiting source of carbon. *From author's summary.*

1200. HEUSER, E., SHEMA, B. F., SHOCKLEY, W., APPLING, J. W., and MCCOY, J. F. **The effect of lignin-destroying fungi upon the carbohydrate fraction of wood.** *Arch. Biochem.* 21 (2), 1949 (343–50). 6 refs. [Institute of Paper Chemistry, Appleton, Wis.] O.R.S.

Aspen [*Populus tremuloides*] wood was inoculated with *Polyporus paragamenus* and subjected to 20 months' incubation. The results of an analysis of 3 portions of the wood (representing 3 stages of attack) show that *P. paragamenus* removed increasing quantities of lignin from the wood and would probably have removed the lignin altogether in time. Those portions of carbohydrate materials remaining in the fungus-treated samples, however, were considerably degraded. Further experiments were made to investigate the influence of the presence of the lignin or the pentosans, or both, on the degradation of the cellulose components. Isolated cellulose and holocellulose prepared from Aspen wood were inoculated with *P. paragamenus* and analysed after an incubation period of 9 months. It was concluded that pure cellulose is only slightly attacked by the lignin-destroying fungus, but that the presence of pentosans in a cellulosic material intensifies the attack upon the cellulose constituent, and, in wood, both the pentosans and the lignin seem to favour the attack of the fungus upon the cellulose constituent.

1201. YOUNG, H. E. **Bluestained case timber and mould rots in hen eggs.** *Queensland Journal of Agricultural Science, Brisbane* 5 (3), 1948 (141–7). H.S.B.

Experiments showed that mould rots in eggs can be artificially produced by infection with spores of a stain fungus (*Trichoderma lignorum*) isolated from case timber, but that early treatment of the eggs with the Na salt of salicyl anilide was an effective preventive. Trials showed that in normal export conditions blue-stained Hoop Pine (*Araucaria cunninghamii*) case timbers have no effect on the quality of eggs.

31.43. Attack by Animal Organisms

See also *For. Abstr.* 12 (Nos. 1221–4, 1378–85, 1427).

1202. SCHMIDT, H. Die tierischen Schädlinge des Holzes. **[Animal pests of wood.]** M. & H. Schaper, Hannover. 1949. pp. 143. Many refs. [G.]

An informative and practical guide to morphology, physiology, propagation, noxiousness and suppression of the principal animal pests (including Mollusca and Crustacea) of wood and timber.

1203. SHAPIRO, L. D. Pritvoryashki (Ptinidae) i kozheedy (Dermestidae) kak razrushiteli drevesiny. **[Ptinidae and Dermestidae attacking wood.]** *Entomologicheskoe Obozrenie, Moskva* 30 (1/2), 1948 (53–9). 5 refs. [Russ.] X.

Records, with photographs, cases of damage caused by larvae of ptinid and dermestid beetles when making pupation sites. *Ptinus fur*, which is frequent as a pest of animal and vegetable products stored in warehouses in the U.S.S.R., makes shallow holes in which it pupates, generally more or less level with the surface of the goods in the boxes. Such damage is widespread, occurring in various wooden household food containers in contact with the foodstuff attacked by the larvae. A combined attack by *P. fur* and *P. tectus* was discovered in a plywood factory store where casein and albumin glues were the food of the larvae. It proved impossible to distinguish the damage caused by these two species unless cocoons or fragments of cocoons were present. Dermestids found damaging wood were *Dermestes lardarius, D. vulpinus* and *Altagenus piceus*, which occurred in plywood, fur, leather and meat-products factories etc. Some cases of damage by the two *Dermestes* species were severe and, unlike those of the ptinids, the attacks were not restricted to the immediate vicinity of the food used by the larvae.

1204. KELSEY, J. M. **A note on the life-cycle of *Anobium punctatum* de Geer.** *N.Z. J. Sci. Technol.* 30 (4), 1949 (211–4). 2 refs. P.R.

The life cycle is not less than 3 years in air-dried sapwood of *Podocarpus dacrydioides* or

4 years in air-dried sapwood of *Pinus radiata* when recently milled. In both timbers the life cycle for some individuals exceeded the above figures by at least one year. Kiln drying of timber prolongs the life cycle but does not prevent infestation. *From author's summary.*

1205. PLANK, H. K. **Biology of the Bamboo powder-post beetle in Puerto Rico.** *Bull. fed. exp. Sta. Puerto Rico* No. 44, 1948. pp. 29. 13 refs. P.R.

Describes and illustrates its life history and distribution, the products attacked, and its natural enemies. [Cf. *For. Abstr.* 11 (No. 1908); 12 (No. 402).]

1206. GRAHAM, K., and RICHMOND, H. A. **Ambrosia beetles.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (2), 1950 (2–4). [See also Graham, K., Kinghorn, J. M., and Webb, W. E., in *B. C. Lumberm.* 34 (8), 1950 (43–4, 98, 100, 102, 104).]

This report deals with part of a project to study degrade of logs through damage by ambrosia beetles during storage. Analysis of sawn timber showed that for *Trypodendron cavifrons* attacks, the total number of holes appearing on an end-grain surface is directly proportional to the number of beetle entrance holes in the log surface. A relatively constant relationship holds, moreover, for all densities of attack. Thus, in Hemlock, for every hole per sq. ft. of log surface, there are, on the average, 240 holes per 1,000 linear ft. of edge-grain face, or 1 every 4 linear ft. If there are 100 holes per sq. ft. of log surface, as is not infrequent, there would be 24,000 holes per 1,000 linear ft., or 24 per ft. of edge-grain face. The distribution in depth is such that, for all densities of attack, certain definite proportions of all holes occur at stated depths. The percentages occurring in the outer 1, 1½, 2 and 2½ in. are shown in a diagram. For purposes of mill studies or of log deterioration, involving *T. cavifrons*, the number of holes in the log surface will generally suffice as the 'damage index' denoting the severity of injury inside the log. The proportion of the total log content exhibiting the damage will be inversely related to log diameter. The amount of lumber degraded, and the severity of degrade, will be related to, and thus described by, beetle attacks per sq. ft. of log surface, proportion of log contents involved by the attack, and the grade of the log.

31.45. Injury by Fire

See also *For. Abstr.* 12 (Nos. 1350, 1388, 1430).

1207. BIRD, E. L., and DOCKING, S. J. **Fire in buildings.** Adam & Charles Black, 4, 5 & 6 Soho Square, London, W. 1949. pp. 295 + 50 photos. 72 refs. P.R.

Includes sections on the fire resistance of wood in different forms (shavings, thin boards, fibre boards and baulks) and on the risk of fire in timber yards and stores, and in buildings constructed of wood and with wooden fittings.

31.8. *Quality and Defects of Timber*

See also *For. Abstr.* 12 (Nos. 1159, 1399, 1541).

1208. PAUL, B. H. **Quality of second-growth Douglas-Fir and suggested means of improvement.** *Prepr. U.S. For. Prod. Res. Soc.* No. 106, 1950. pp. 5. 2 refs. P.R.

Research at the U.S. Forest Products Laboratory has demonstrated that age and size are the main causes of difference between second-growth and old-growth Douglas Fir. Approximately 150 years elapse before Douglas Fir trees begin to produce clear, knot-free lumber of high quality. The relationship between specific gravity and strength was found to be the same for both old and second growth; as a result of the greater proportion of wide-ringed wood in second-growth trees, however, more of it is of lower density than old growth, with correspondingly lower strength properties. [Cf. *For. Abstr.* 12 (No. 403).] *Author's summary.*

1209. ANDERSON, A. B. **Chemistry of western Pines. Pine knots and paint durability.** *Industr. Engng. Chem.* 42 (3), 1950 (565–9). 12 refs. P.R.

The damage to paint covering Pine knots in Pine lumber (*Pinus ponderosa, P. monticola, P. lambertiana*) has been proved to be due to specific components in the knot extract. A new knot-sealer formula has been suggested.

1210. PILLOW, M. Y. **Presence of tension wood in Mahogany in relation to longitudinal shrinkage.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1763, 1950. pp. 6 + 4 photos, 3 gphs. 2 refs. P.R.

Significant correlation was shown to exist between longitudinal shrinkage and the amounts of gelatinous fibres that characterize tension wood. It was concluded that differential shrinkage caused by irregular distribution of tension wood, sets up internal stresses resulting in frequent warping. [Cf. *For. Abst.* 12 (No. 1159).] *From author's summary.*

32. HARVESTING OF WOOD. LOGGING

See also *For. Abstr.* 12 (No. 985).

1211. Føyn, P. Driftsteknikk i skogbruket: rapport fra en stipendiereise til Canada og U.S.A. 1948. [**Operational technique in forestry: report on a study tour of Canada and the U.S.A., 1948.**] *Suppl.* to *Tidsskr. Skogbr.* 58 (3), 1950. pp. 35. [Nor.]

Miscellaneous notes on technique, with special reference to mechanized methods and equipment used in timber extraction and transport.

1212. Maheu, C.-F. Opérations forestières sur la côte pacifique. [**Logging on the Pacific Coast.**] *Bois For. Trop.* No. 14, 1950 (127–40). [F.]

1213. Simmons, F. C. **New developments in harvesting sawlogs.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (32–43). P.R. Also in *Timber of Canada* 10 (9), 1950 (25–8, 50, 52, 56–60).

Describes, with illustrations, new equipment used in felling, skidding, cross-cutting, loading and hauling.

1214. Platzer, H. B., Sackel, W., and Seifert, H. Das Selbstanfertigen von Holzhauergerät [**Home-made tools and equipment for forest workers.**] *Merkblatt, Gesellschaft für forstliche Arbeitswissenschaft e.V., Hannover* No. 23, 1949. pp. 43 + 4 dgms. 11 refs.

32.2. *Felling and Related Operations*

1215. Stewart, A. M. **A review of the results obtained in training choppers in pulpwood operations.** *Woodl. Sect. Index Canad. Pulp Paper Ass.* No. 1073 (*B*–2), 1950. pp. 5.

1216. Paish, H. P. S. **Splitting wedges.** *Brit. Patent* No. 603,135, June 9, 1948. *Abstr.* in *Timber News* 58 (2133), 1950 (300–1).

Describes a compound splitting wedge having a main wedge and a pilot wedge or lead of reduced width.

1217. **Develops new hydraulic barker.** *Timber of Canada* 10 (8), 1950 (50).

The machine, designed by H. A. Simons, Vancouver, is in use at the mill of the Canadian White Pine Co. on the Fraser River. It uses comparatively low h.p. and volume of water, is more simply designed than previous machines and costs less initially. Screened river water is pumped by a 25-h.p. pump through a battery of 4 vortraps, each holding 200 gal./min. The injection of water into the vertical column separates out the silt by centrifugal force, the clean water passing on to the next pump. At this stage a 150-h.p. centrifugal pump raises the pressure to 250 lb./sq. in. The water is then fed to an eight-stage Bingham pump, where the pressure is raised to 1,450 lb./sq. in. This pump is directly coupled to a 3,600-r.p.m. steam turbine, pumping 600 gal./min. The water is then carried through 6-in. heavy hydraulic pipes to the barking units, each of which consists of a pair of nozzles, one mounted at each end of a header welded to a tubular shaft, into which the water is delivered. The shaft is rotated by V-belt drive, and the log, being carried past the jets, receives the impact of the water in a progressive circular pattern.

1218. **Union Lumber Company develops new cold-decking unit.** *Lumberm.* 77 (7), 1950 (78–9).

The unit possesses 2 hydraulically operated power tongs mounted on a spreader bar. The wooden fantail boom has two fall blocks with lines running to 2 drums on the machine, so that either end of the spreader bar can be raised or lowered independently. The machine, which was developed by the Union Lumber Co., Fort Bragg, Calif., can be used both at mill and in the forest.

32.8. *Grading and Storage of Wood in the Rough*

See also *For. Abstr.* 12 (Nos. 1206, 1311, 1443, 1450).

1219. Hill, J. L. **A simple method for selecting Balsa (*Ochroma lagopus* Sw.) of high tensile strength.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (413–24). 7 refs. [School of

Forestry, Yale University, New Haven, Connecticut.] P.R.

The method consists in sawing across the ends of logs (a 13-in. circular groover saw with ¼-in. kerf gave the best results) and classifying the material by 'sawn appearance' of the end grain into 3 groups: (1) surface almost entirely fibrous in character with little if any brash failure showing; (2) all variations between (1) and (3); and (3) surface showing no broken fibres and having a brash appearance. These groups are illustrated in photographs. Tensile strength tests of specimens from each group gave strengths of 3,958, 2,064 and 1,305 lb./sq. in. for groups 1, 2 and 3 respectively. Specific gravity for group 1 was higher than that for the other two. A study of the anatomy of specimens from each group showed that 2 and 3 had considerably less fibre and more parenchyma than group 1; the high proportion of parenchyma to fibre is considered to be largely responsible for the poor tensile strength of low-grade Balsa.

1220. Pascoe, T. A., and Scheffer, T. C. **Jack Pine pulpwood deterioration in yard storage.** *Paper Tr. J.* 131 (2), 1950 (16–8, 20–1). 11 refs. P.R.

Portions of the wood were in typical storage for 21 months. Five mill-scale pulpings were made on the rough wood and 2 on the peeled wood, using the sulphate process. Pulp was made at each storage interval into a standard grade of paper. Auxiliary studies were carried out to determine the effect of applying a fungicide, which proved ineffective. Paper made from pulps from rough wood showed greater loss in mullen strength with increase in wood storage time, whereas laboratory beater tests showed greater loss in tearing strength as wood storage time increased. The loss in the strength of pulps made from peeled wood was much less than in the case of rough wood. *From authors' summary.*

1221. Desch, H. E. **Protection against sap-stain fungi.** *Timb. & Plyw.* 97 (2518), 1949 (604, 607). P.R.

The adult ambrosia beetles do not attack wood if it is dried below the moisture content necessary to sustain growth of the ambrosia fungus. Similarly, sap-stain fungi require a relatively high moisture content for their active growth. The most important single factor in protecting timber against both the ambrosia beetle and the sap-stain fungus, is the speed of wood conversion and rapid drying of converted timber. When formulating measures to be taken against pin-hole borers, it is essential to establish whether attack has occurred before or after felling, as prophylactic chemical treatments are efficient only in the latter case.

1222. Browne, F. G. **Ambrosia beetle attack on logs of Tembusu [*Fagraea fragrans*] and Meranti Tembaga [*Shorea leprosula*].** *Malay. Forester* 13 (3), 1950 (167–8). [Forest Research Institute, Kepong.]

An experiment was carried out at Kepong to compare the susceptibility of these two species to attack by ambrosia beetle. General observation suggested that logs of the first species were relatively immune, and those of the second very susceptible. The test was in two sections, (1) barked and (2) unbarked, and in each, 3 logs of each species were placed, alternately by species, about 18 in. apart and raised a few inches off the ground. After 4 weeks the unbarked logs were peeled, and all ambrosia-beetle holes in both sections were examined. Only two species were found—*Xyleborus pseudopilifer*, which usually attacks only Dipterocarps and was therefore disregarded, and *X. declivigranulatus*, which is polyphagous. The mean numbers of holes of *X. declivigranulatus* per sq. ft. after 4 weeks for *Fagraea fragrans* and *Shorea leprosula* respectively were 0·33 and 4·39 for unbarked, and 4·32 and 0·59 for barked logs. This remarkable reversal of the intensity of infestation in the two sections of the test, suggests that the wood of *F. fragrans* is actually more attractive than that of *S. leprosula*, but that the source of attraction is masked by the bark, which is thick and hard. In young *S. leprosula* trees, such as were used in this test, the bark is rather thin and soft.

1223. Kowal, R. J. **Control of wood-boring insects in green logs and lumber.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (469–79). 6 refs. [U.S. Department of Agriculture, Bureau of Entomology and Plant Quarantine.] P.R.

Communicates results of 3 years' tests with both hardwoods and softwoods, especially against ambrosia beetles. Best protection was given by 666, for both logs and timber. Results of the tests with 666 and other insecticides are tabulated.

1224. Alliot, H., and Ivanès, P. Protection des bois en grumes au Cameroun. [**Preservation of logs in French Cameroons.**] *Bois For. Trop.* No. 14, 1950 (163–8). [F.e.span.]

Describes the use of Cryptogil EA6, which has both insecticidal and fungicidal properties, for the protection of logs. Spraying is done, as soon as possible after felling, with a 1 : 2 emulsion of Cryptogil and water. Smooth-barked species such as *Terminalia superba* need barking first; rough-barked species such as *Pycnanthus kombo* do not. Some directions are given about spraying apparatus, which must be strong but light, having no parts of natural rubber. Plastic materials or aluminium are better than copper or brass.

32.9. *Transport*

1225. Sallenave, P. Humidité des bois en grumes et prix de transport. [**Moisture in logs and the cost of transport.**] *Bois For. Trop.* No. 14, 1950 (169–70). [F.e.span.]

It is calculated that logs of tropical species imported into France provide only 36·4% of their volume in sawn timber and 63·6% waste products (27·3% excess moisture and 36·3% sawdust, edgings etc.). The greatest effort should therefore be made to develop and improve sawmilling in the colonies.

32.91. Land Transport

1226. Fobes, E. W. **Hydraulic skidding attachment.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–22, 1947. pp. 1 + 2 drawings, 1 dgm. P.R.

This attachment for tree-length skidding, consists of a horizontal draw-bar, a vertical brace, and a movable arm. It does not interfere with the use of the tractor for other purposes. [Cf. *For. Abstr.* 12 (No. 1234).]

1227. Fobes, E. W. **Combined bunching and skidding.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–24, 1948. pp. 1 + 2 dgms. P.R.

See *For. Abstr.* 10 (No. 2668).

1228. [Kelly, J. L.] **Sliding resistance of [steel] sleigh shoeing.** *Woodl. Sect. Mem. Canad. Pulp Pap. Ass.* No. 19–50, 1950. pp. 3.

1229. Martin, P.-H. Le transport des grumes sur véhicules à roues. [**Log transport by wheeled vehicles.**] *Bois For. Trop.* No. 14, 1950 (171–92). [F.e.span.]

Detailed discussion of transport of logs by lorry coupled to a special semi-trailer. The coupling should be extensible and easy to manoeuvre both backwards and forwards, and the semi-trailer should be fitted with brakes and built so as to be hoisted on the lorry when not in use. If possible, the lorry should be fitted with a winch, to be driven by the engine, for loading and unloading. Specifications of lorries and trailers for loads of 10, 12, 13, 14, 15, 20, 22, 24 and 35 tons respectively are given in tabular form.

1230. Bergeron, J. R., and Perreault, H. C. **Lac à Jim flume.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1081 (*B*–9–*d*), [1950]. pp. 5.

Describes the construction of a flume 8⅝ miles long, built in 3½ months, in order to transport some 225,000–375,000 cords of 4-ft. pulpwood. Amounts of timber used and labour expended on the job are given. In order to lift the pulpwood from the lake where it was collected, into the gravity-flow flume, it was necessary to construct a 3-chain log haul-up with a vertical rise of 76 ft. and an inclination of 25°. Water is supplied to the flume at a rate of 6,375 gal./min. by a centrifugal pump. A mean output of 50 cords/ day was obtained over a 14-hr. working day.

32.92–4. Water Transport

1231. Koroleff, A. **Rope boom with hardwood wedges.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 83 (*B*–9–*e*), 1950. p. 1.

Describes and illustrates a type of hardwood wedge used by the Gould Paper Co., Lyons Falls, N.Y., when making temporary booms. The wedges, which are forked, are driven into the end of the log, so that they pinch and hold a light rope. When the boom is dismantled, a sideways blow with an axe breaks the wedge close to the log and releases the rope.

1232. Hale, J. D. **Factors that affect the buoyancy of pulpwood logs. I. Sapwood.** *Mimeo. For. Prod. Lab., Can.* No.0–157, 1950. pp. 8.

The importance of the relationship between the proportion of sapwood and the decline of buoyancy of floating logs is stressed. Losses

by sinking are higher in logs of small diameter, because of the greater proportion of sapwood. Indications of the distinction between heartwood and sapwood include: the smoother surface of the sawn face of sapwood in softer woods of relatively low density (e.g. Aspen, Balsam, Fir, Hemlock, Pines and White Spruce); the presence of blue stain; exudation of fluid resin from the sapwood of Pine, Spruce and Larch immediately after felling. Chemical indicators include: I, $HClO_4$, and a solution of benzidine in HCl, or an indelible pencil can be used to outline the boundary of the sapwood. Visual methods are, however, more suitable for field conditions. If sufficient data can be collected, it should be possible to recognize logs of different species which are certain to sink; these might be treated to improve buoyancy, or used without floating.

32.95. Ropeways. Cableways

1233. FOBES, E. W. **Single line continuously moving cable systems.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–29, 1949. pp. 1 + 3 dgms. P.R.

32.96 Loading and Unloading

1234. FOBES, E. W. **Hydraulic hoist log loader.** *Rep. U.S. For. Prod. Lab. Madison* No. *R*1637–39, 1949. pp. 1 + 1 dgm. P.R.

Describes a loader which is essentially the hydraulic skidding attachment [cf. *For. Abstr.* 12 (No. 1226)] with a welded-on steel collar. The loader is used for picking up scattered logs and logs from small piles along haul roads.

1235. FOBES, E. W. **Self-loader for long logs.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–32, 1949. pp. 1 + 2 photos. P.R.

Describes a truck-tractor and semi-trailer loading unit. The loading mechanism is built on the truck-tractor. Power is supplied by the truck motor to a winch mounted near the base of the mast erected behind the cab. Tongs are used to pick up logs near their midpoint. Once in the air, the loading boom is swung to place the log in position on the load.

1236. FOBES, E. W. **Racking short sawlogs for truck loading.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–31, 1949. p. 1 + 3 photos. P.R.

In this simple method (E. Oklahoma) the lorry has a power take-off winch, one free pipe roller, and a fixed roller on the rear end. The racks, consisting of 2 well braced timber skids, are loaded, and a short cable is looped round each end of the front stringer. The winch cable is hooked on and lifts the rack up and over the rear roller until it falls on the pipe roller. To unload, the winch is disengaged, the load loosened, and the truck stopped abruptly when backing.

1237. FOBES, E. W. **Preloading pulpwood racks.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–28, 1948. pp. 1 + 3 photos. P.R.

See *For. Abstr.* 11 (No. 1180).

33. CONVERSION AND PRESERVATION OF WOOD

1238. HOYLE, R. J., and STILLINGER, J. R. **Wood-using industries of New York.** *Tech. Publ. N.Y. St. Coll. For.* No. 27 (rev.), 1949. pp. 133. P.R.

Includes sections on: wood-using industries in New York's economy, secondary wood-using industries, amounts of wood used by some 60 industries, use of wood by species, and a directory of manufacturers, with a table showing amount of wood of different species consumed by different industries.

33.1. *Mechanical Conversion excluding the Manufacture of Mechanical Pulp*

1239. SZAWŁOWSKI, K. Siłownie cieplne przemysłu drzewnego (Ruch, obsługa, konserwacja, badania). [**Fuel-operated power stations in the wood industry (Operation, service, maintenance, testing).**] *Podręczn. (Ser. D) Inst. Bad. Leśn.* No. 8, 1950. pp. 238. [Pol.]

A textbook dealing with boilers, pipe connections, steam engines, steam turbines, heat accumulators and internal combustion engines (including gas generators). Special attention is given to wood waste used as fuel. [Cf. *For. Abstr.* 12 (Nos. 1246–8).]

1240. CRESTIN, F. Les turbines dans l'industrie du bois. [**Turbines in the timber industry.**] *Rev. Bois Appl.* 4 (7/8; 9/10; 11), 1040 (18–20; 17–21; 24, 29). [F.]

1241. Maschinen und Werkzeuge auf der Frankfurter Frühjahrsmesse. **[Machines and tools at the Frankfurt spring fair.]** *Holztechnik* 30 (3), 1950 (66, 68, 70, 72, 74–87). [G.] P.R.

Describes, with photographs, woodworking tools and machines manufactured by some 40 German firms.

1242. Halle IV. Holzbearbeitungsmaschinen und Zubehör. **[Hall IV. Woodworking machines and accessories.]** *Holztechnik* 30 (4), 1950 (102–24, 127–8). P.R.

Describes, with illustrations, machines manufactured by some 70 German firms and exhibited at the Hanover Industrial Fair, 1950.

1243. La qualité des aciers et l'usinage des bois et des contreplaqués. **[The quality of steels and the milling of wood and plywood.]** *Rapp. Lab. Inst. nat. Bois* 1948–9 (29–34). [F.] P.R.

Tests were made of the cutting quality of various steels, by mounting the blades on a head like the cutting irons of a planing machine and recording the number of metres of milled wood obtained, using *Parinari tenuifolia* (containing 1–1·5% SiO_2) and *Licania incana* (3% SiO_2). Further experiments were made using Poplar plywood glued with kaurit glue. Results are tabulated.

1244. Les aciers à outils et l'usinage des bois collés ou contreplaqués. **[Tool steels and the machining of glued wood or plywood.]** *Étude tech., Inst. nat. Bois* No. 2, 1950. pp. 8. [F.] P.R.

Results are given of tests carried out with cutting tools made of various kinds of tool steel of French manufacture. Absolute values of wear are not reproducible; the abrasive effect of the glue is a highly variable factor.

1245. Mack, J. J. **Some notes on the holding power of nails.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 180, 1950 (6). 2 refs.

Tests on various types of nails (barbed or jagged, twisted or spiral, cement-coated, rusted and sand-rumbled, and plain) showed that twisted and rusted nails had highest static and impact holding power. Twisted nails had 40–70% and rusted nails 50% greater holding power than plain nails. Recent tests indicate a falling-off in holding power of plain nails, attributed to improved methods of wire drawing which give a smoother wire. Predrilling of timber reduces its splitting tendency and may slightly increase the withdrawing resistance of the nails, but is inconvenient and uneconomic. The shape of the nail point is a factor in splitting, and blunt, blunt tapered and bifurcated points tend to reduce splitting but lessen the holding power slightly. [Cf. *For. Abstr.* 12 (Nos. 1428–9, 1536).]

Use of Wastes

See also *For. Abstr.* 12 (Nos. 1239, 1314, 1344–8, 1414–6, 1469).

1246. Dodge, C., and Smyth, H. A. **Spreader stoker firing of hogged wood.** *Lumberm.* 77 (7), 1950 (53, 55). [Weyerhaeuser Timber Co.]

More efficient use of fuel has been obtained with the wood-burning steam-generating unit at Longview, Wash., by the addition of a spreader stoker. The new unit now includes a wood storage and feeding bin, a four-unit spreader stoker in the front wall of the dutch oven, a steam-operated dumping grate and an overfire air system. About 20 min. supply of fuel can be held in the storage and feeding bin. The rate of flow into the furnace is controlled by the speed of chain feeders at the bottom of the bin. From the feeders the wood drops directly into the distributor assemblies of the stoker which spread it evenly over the entire grate surface. The forced-draught air is introduced, through a duct under the boiler, into 4 plenum chambers under the grate. A high-resistance, low-air-space grate ensures equal distribution of air under the entire grate surface, which, combined with the equal distribution of fuel above, gives equal combustion rates on each square foot of the grate surface. With 4 sets of feeders, distributors, grates and plenum chambers, there are actually 4 separately controlled fires in the furnace, so that one can be burned out and cleaned while the others continue to function.

1247. Beecher, H. W. **Burning of wood waste in the pulp and paper industry.** *Tappi* 32 (3), 1949 (117–8). L.S.

Gives an evaluation of log fuel, with special reference to the pulp and paper mills of the Pacific Northwest of the U.S.A. Includes observations on boiler operation when wood waste is used, and a chart giving the relative

costs per million B.Th.U. with various fuels (oil, two grades of coal, Hemlock wood, Fir wood).

1248. FELDMAN, E. S., and ROSNICK, L. M. **Wood waste disposal and air pollution control in the Los Angeles area.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (256–63). 14 refs. P.R.

Recommendations are made on methods and equipment for destroying wood waste by burning without violating laws on atmospheric pollution. More data on the amount of air used in combustion, temperatures, and combustion space, are needed by designers and manufacturers of incinerators. There is no market for wood waste as fuel in the Los Angeles district.

1249. MIDGLEY, A. R. **The use of sawdust, shavings and superphosphate with dairy manure.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 32, 1950 (15–23). 3 refs. P.R.

Pine sawdust and shavings were shown to compare favourably as bedding materials with chopped straw or old hay in absorbing liquids and saving the N and K in manure.

1250. WHITE, J. W. **Comparisons of sawdust and wheat straw for bedding.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 32, 1950 (25–6). P.R.

It was found that the rate of decomposition of sawdust (with or without manure) is less than that of wheat straw. Tests with manures showed that sawdust treatment gave a greater amount of soil nitrates than straw. [Cf. *For. Abstr.* 12 (Nos. 929, 1093).]

33.12. Joinery, Furniture and Cabinet Making, Wood Bending

See also *For. Abstr.* 12 (Nos. 1266–8, 1294–7).

1251. WELLER, G. W. **Craft of the wheelwright.** *Ill. Carp. Build.* 139 (3799; 3800; 3801), 1950 (970, 972; 1010, 1012, 1014; 1052, 1054). P.R.

1252. GROSSMANN, B. Lehrbuch für Zimmerer, Teil I–III. **[Textbook for carpenters, Parts I–III.]** Gebr. Jänecke, Abt. Buchverlag, Hannover. 1947. pp. 132 + 191 + 186. [G.] P.R.

An elementary work.

1253. JORDAN, C. A. **Wood-bending apparatus.** *U.S. Patent* No. 2,502,460, Apr. 4, 1950. pp. 4 + 6 dgms. P.R.

An improved apparatus consisting of a modified tension strap and reversed levers for applying end pressure so as to provide rigid end blocks, convenient adjustment to different lengths of bending sticks, and control of end pressure.

1254. GASKELL, T. **Improvements in or relating to universal wood-working machines.** *Brit. Patent* No. 639,739, July 5, 1950. pp. 5 + 3 dgms. P.R.

Describes universal woodworking machines and, in particular, universal slide-head crosscut saws in which the circular saw is capable of sawing either crosswise or longitudinally or at an intermediate angle to the bench. These machines are claimed to be suitable for a variety of other purposes, such as ploughing, grooving, rabbeting, trenching and tenoning, by the use of suitable cutting tools.

1255. FREEDLAND, M. M. **Means for tenoning and haunching pieces of wood.** *Brit. Patent* No. 604,627, July 7, 1948. *Abstr.* in *Timber News* 58 (2132), 1950 (263).

1256. MICHAUD, J. De l'alésage des fraises modernes et de leur affûtage. **[The centring of modern milling-cutters and their sharpening.]** *Rev. Bois Appl.* 5 (7/8), 1950 (3–7). [F.] P.R.

Describes a machine for sharpening milling-cutters, and stresses the importance of using cutters with a properly centred bore. Analyses the causes of faulty milling.

1257. HAYCOCK, A. H. **Principles of machine woodworking: Cutter setting technique (2). Jointing cutters [1], (2).** *Wood* 15 (6–8), 1950 (210–3; 247–50; 288–91).

1258. WILKINS, W. B. **Handling of assembly materials in furniture manufacture.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (110–4). P.R.

Methods of speeding up and reducing the costs of assembly operations are described.

1259. GIVIDEN, J. H. **Supplementing wood with metal in furniture manufacturing.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (115–20). P.R.

33.13. Cooperage. Shingles

1260. **The wooden barrel manual.** Associated Cooperage Industries of America, Inc., St. Louis, Mo. Revised, 1947. pp. 108. P.R.

Contains specifications, information on manufacture, transport, tools, measurements and capacities, and a dictionary of cooperage terms.

1261. WAGNER, J. B. **The cylinder stave saw.** *Barrel & Box & Packages, Arlington Heights, Ill.* 54 (12), 1949 (7–9). P.A.T.R.A.

Describes the technique of operating and maintaining cylinder stave saws for sawing out 'bilge-shaped' staves.

1262. EDMONDS, D. H. **The humble bung.** *Brewing Trade Review, London* 64 (765), 1950 (117–20). L.S.

The choice of species is discussed. The best substitute for Canarywood or American Bung Poplar [*Liriodendron tulipifera*] is Finnish Birch. Home-grown hardwoods such as Sycamore [*Acer pseudoplatanus*] and Beech are sometimes used; dote in Beech increases the porousness of the wood but is not otherwise a serious defect, since any harmful bacteria will have been killed by the kiln-seasoning process. The most suitable for non-porous spiles are heartwood of American Red Gum [*Liquidambar styraciflua*] or of Oak; Hazel is the best substitute, but Beech, Birch and Sycamore are also used. Porous pegs are made from rattan or Turkey Oak [*Q. cerris*]. The best timber for tap plugs is Canarywood; Lime and American Red Gum are good substitutes. The total amount of timber used annually in the manufacture of shives and tap plugs in Great Britain is about 4,500 tons.

33.15. Manufacture and Use of Veneers and Laminated Wood. Improved Woods. Laminated Materials other than Wood. Glues and Gluing

33.15.1. *Manufacture of Veneers and Laminated Wood*

See also *For. Abstr.* 12 (Nos. 1243–4, 1385–6).

1263. KREJCI, J. Die Furnierindustrie in Österreich. [**The veneer industry in Austria.**] Verlag Freytag-Berndt und Artaria, Wien. 1948. pp. 122. Many refs. [G.]

1264. SAKS, E. V. **Plywood production is born in the bush.** *Veneers & Plyw.* 44 (7), 1950 (20–1). P.R.

General information on the plywood industry on the Pacific coast of North America.

1265. HYLER, J. E. **Continuous feed applied to jointing technique [in veneer manufacture.]** *Veneers & Plyw.* 44 (5), 1950 (30, 32). P.R.

1266. DOSKER, C. D. (to Gamble Brothers, Louisville, Ky.). **Adjustable jig for manufacturing laminated timbers.** *U.S. Patent* No. 2,472,006, May 31, 1949. pp. 14 + 14 dgms. 12 refs. P.R.

Describes an adjustable jig suited for use in the manufacture of both straight and curved laminated timbers.

1267. GRAHAM, P. H. **Commercial molded plywood methods much improved.** *Veneers & Plyw.* 44 (7), 1950 (12–4). P.R.

Review of modern methods of moulding plywood. [Cf. *For. Abstr.* 12 (No. 1293).]

1268. MILES, T. R. **Prime considerations in molding plywood.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (156–60). P.R.

Points considered are: compound curvature and minimum bending radius; selection of veneer, resin, and moulding method; design of tools; and costs.

1269. **Veneer cutting and drying properties. Red alder (*Alnus rubra*).** *Rep. U.S. For. Prod. Lab., Madison* No. D1766–2, 1950. pp. 2. 4 refs. P.R. Also in *Wood Prod.* 55 (7), 1950 (33–4).

Laboratory tests covering the preparation of logs for cutting, suitable lathe settings, and veneer drying, were made on bolts of Red Alder (*Alnus rubra*). The wood was found to be in excellent condition for cutting after washing in water at 140° F. for about 8 hr. for a 12-in. and 15 hr. for a 16-in. bolt, both 4 ft. long. It is possible that good veneer could be cut from unheated wood, and heating in steam would probably result in overheating. A thorough study of lathe settings has not been made, but settings that produce tight, smooth veneer are given for 3 veneer thicknesses. The

green veneer varied in moisture content from 71 to 105%. At a temperature of 250°, the $\frac{1}{32}$- and $\frac{1}{24}$-in. veneer dried in 5 minutes to a moisture content of 2–3%; it was rather brittle and split in handling. The $\frac{1}{16}$-in. veneer dried in 8 min. to about 5%. Tangential shrinking based on green width was about 7%.

1270. **Veneer cutting and drying properties. Water Oak.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1766–1, 1950. pp. 3 + 3 tbls. 4 refs. P.R. Also in *Wood Prod.* 55 (8), 1950 (16–7).

Tests were made on good- and bad-quality logs of Water Oak (which includes *Q. nigra, Q. phellos, Q. laurifolia* and may include other species, e.g. *Q. lyrata*). If the logs are heated in water, optimum heating temperature is 150° F. Required heating times at 150° vary from 5 hr. for logs 12 in., to 85 hr. for those 30 in. in diameter. Recommended lathe settings are tabulated. Drying schedules giving good results are included.

1271. POLETIKA, N. V. **Lamination of Connecticut Red Oak.** *Bull. Conn. agric. Exp. Sta.* No. 537, 1950. pp. 48. 21 refs.

This bulletin presents a comprehensive evaluation of the factors affecting the laminating of Connecticut-grown Red Oak [*Quercus borealis* var. *maxima*], including the yield of material suitable for laminating, the properties and characteristics of laminated lumber, and recommendations for methods of manufacture. Consideration is given to strength, freedom from warp, and glue-joint durability, the effect of wood variability upon these factors, and methods of controlling the influence of this variability. [Cf. *For. Abstr.* 10 (No. 1996).]

1272. TOOLE, A. W., and DANIELSON, C. W. **The utility of No. 3 Common northern hardwood lumber for mechanized processing into glued products.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (94–103). P.R.

Data are given showing the economic possibilities of using low-grade timber for glued products.

1273. DAVIS, E. M. **Shaping the end grain of Redwood for core stock.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1755, 1950. pp. 11 + 2 photos. P.R.

Tests were made on 15 groups of material, including flat grain, vertical grain, all heartwood, heartwood and sapwood, and controls of Yellow Poplar. Results are tabulated, showing the amount of tear-out (spots where wood has been torn out below the general surface level) and roughness (wood or groups of fibres projecting above the general level). With very few exceptions, the Redwood [*Sequoia sempervirens*] shaped better on the end grain than the Yellow Poplar [*Liriodendron tulipifera*], which, although not one of the best woods for end-grain shaping, is considered a satisfactory core material. Details are given of machines (jointer, circular cross-cut saw, and spindle shaper) making fairly smooth cuts. Heartwood gave consistently better results than sapwood. Higher cutter speeds improved the results. The direction of the grain made little difference to roughness but tear-outs were less frequent in vertical grain. Density and number of rings per in. were minor factors only. Best results were obtained with all heartwood, vertical-grain wood and a 45° included angle on the cutting edge of shaper knives.

1274. LIPKA, W. Tischlerplatten mit Mittellagen aus Buchenholzstäbchen. [**Boards for cabinet-making with cores made from Beech-wood blocks.**] *Holztechnik* 30 (5), 1950 (133–5). P.R.

Discusses the possibility of using Beech-wood blocks for blockboards. Beechwood must be adequately steamed and artificially dried before being cut into blocks. It is suggested that the existing prejudice against using blockboard with Beech-wood cores is unfounded.

1275. **Indian [Republic] standard specification for commercial plywood.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50/*FE*/11, 1950. pp. 9. P.R.

Includes sections on definitions, requirements, tests, inspection, marking and delivery, a list of 52 species for use in plywood, and description of 4 tests. [Cf. *For. Abstr.* 12 (No. 1445).]

33.15.2. *Use and Properties of Plywood and other Laminated Wood*

See also *For. Abstr.* 12 (Nos. 1426, 1532–4).

1276. ARMBRUSTER, E. Untersuchungen über die Wirkung der Leimfugenlänge bei

Probekörpern für den Druckscherversuch auf die Scherspannung. [**Research on the effect on the shearing stress of the length of the glued joint in test specimens for the compression-shearing test.**] *Mitt. öst. Ges. Holzforsch.* 2 (3), 1950 (18–22). 3 refs. [G.g.] P.R.

1277. Essais sur pièces industrielles. [**Tests on [laminated] constructions used in industry.**] *Rapp. Lab. Inst. nat. Bois* 1948–9 (60–2). [F.] P.R.

1278. HEEBINK, T. B., and NORRIS, C. B. **Effect of circumferential stiffeners on the buckling properties of thin curved plywood panels in axial compression.** *Rep. U.S. For. Prod. Lab., Madison* No. 1812, 1950. pp. 8 + 1 photo, 2 dgms., 4 gphs., 1 tbl. 6 refs. P.R.

Tabulates the results of tests on 105 stiffened panels, and from analysis of the test data presents a method of selecting stiffeners of minimum size and maximum efficiency.

33.15.3. *Improved Woods*

See also *For. Abstr.* 12 (Nos. 1360, 1368).

1279. NEUSSER, H. Der spezifische Pressdruck als Mittel zur Holzvergütung. [**Specific pressure in the manufacture of improved wood.**] *Mitt. öst. Ges. Holzforsch.* 2 (1; 2), 1950 (15–8; 15–8). [G.] P.R.

Figures are given for the specific gravity of different solid and laminated improved woods. The need to vary the pressure applied for different species is emphasized; some recommended pressures in the manufacture of solid improved woods are 15 kg./sq. cm. for Beech, 10 kg./sq. cm. for Spruce and 5 kg./sq. cm. for Gaboon. Relationships between pressing time, pressure, temperature, the sp. gr. of the finished product, and different glues in the manufacture of improved woods from Beech, are given in graphs and tables.

1280. NARAYANAMURTI, D., and PANDE, J. N. **Preliminary studies on improved wood. Part V. Improved wood (laminated) made with Formvar resin.** *Indian For. Leafl.* No. 113, 1948 (1949). pp. 2 + 2 gphs., 1 tbl. Price *As.* 6 (7*d.*).

Strength properties of veneers (*Bombax malabaricum, Cedrela toona, Dalbergia latifolia, Dysoxylum malabaricum, Mangifera indica, Polyalthia* spp., *Zanthoxylum rhetsa,* and *Dalbergia sissoo*) coated with Formvar (a thermoplastic resin polyvinyl butyral), conditioned to remove the solvent, and pressed, are tabulated and compared with those of Birch Hydulignum. The compressive strength of the samples compared favourable with that of the Hydulignum, but other properties are inferior. Further experiments will be made.

33.15.5. *Glues and Gluing*

See also *For. Abstr.* 12 (No. 1385–6, 1525).

1281. **The story of animal glue. How it is made and graded.** Alfred Adams & Co. Ltd., West Bromwich. [*n.d.*]. pp. 57 + 27 + 4 + 5. P.R.

Booklet giving general information on glue, its raw materials, extraction, instructions for use, the grading system adopted by Adams & Co., testing methods (Bloom gelometer and 'grams Adams'), and factors influencing adhesion. Includes (1) *B.S.* 1. No. 647–1938 (B.S. methods for testing glues), (2) *P.D.* 165 (Amendment No. 1: September 1943 to (1)), (3) *P.D.* 434 (Amendment No. 2: December, 1945 to (1)).

1282. NARAYANAMURTI, D., and PANDE, J. N. **Studies on the storage life of adhesives. Part II—Aerolite 306.** *Indian For. Leafl.* No. 105, 1949. pp. 2 + 2 gphs., 1 tbl. Price *As.*7 (8*d.*).

1283. NARAYANAMURTI, D., RANGANATHAN, V., and DABRAL, M. L. **Studies on adhesives. Part XIII—Whole blood meal adhesive.** *Indian For. Leafl.* No. 108, 1948. pp. 15. Price *As.*4 (5*d.*).

1284. NARAYANAMURTI, D., and JAIN, N. C. **Studies on adhesives. Part XI—A preliminary note on adhesives from Cashewnut [*Anacardium occidentale*] shell oil.** *Indian For. Leafl.* No. 111, 1947 (1949). pp. 8.

Preliminary experiments indicate that a cold-setting adhesive can be prepared from Cashewnut shell oil.

1285. NARAYANAMURTI, D., and SINGH, J. **Studies on adhesives. Part XV—A preliminary note on adhesives from the proteins of the seeds of *Terminalia belerica*.** *Indian For.* 76 (1), 1950 (11–4).

The results of experiments (given in detail) indicate that satisfactory adhesives, both cold-pressed and hot-setting, could be developed from *T. belerica* seed proteins which form *ca.* 35% of the oil-free residue of the seed. The seed contains 38·8% of oil.

1286. BRANDTS, T. G. Houtlijmen. **[Wood glues.]** *Rapp. Bosbouwproefsta., Buitenzorg* No. 31, 1950. pp. 41 + 11 gphs. 36 refs. [Du.jav.e.]

Discusses the manufacture, properties, and uses of animal and vegetable glues and thermo-setting and thermoplastic synthetic-resin glues.

1287. Essais sur les colles. **[Tests on glues.]** *Rapp. Lab. Inst. nat. Bois* 1948–9 (55–60). [F.] P.R.

General tests on glues, and systematic tests on optimum gluing conditions and on resistance to weathering of individual glues, are described and the results tabulated.

1288. HOPKINS, R. P. **Evaluation of resin adhesives.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (292–300). 11 refs. P.R.

Tests on different laminated specimens showed that factors in their construction (direction and thickness of plies, size of specimen, and species of wood) had considerable influence on the performance of adhesives in laboratory and field exposure tests.

1289. ENGLERTH, G. H. **Decay resistance of plywood bonded with various glues.** *Prepr. U.S. For. Prod. Res. Soc.* No. 115, 1950. pp. 6. P.R.

The decay resistance of Sweetgum and Yellow Birch plywood bonded with various glues was evaluated by the time it took wood-destroying fungi (*Polyporus versicolor* and *Lenzites trabea*) to penetrate the plywood and by its loss in weight when exposed to fungi in soil-burial tests. Several cold- and hot-pressed resin adhesives, as well as casein glue, with and without preservatives, were tested. None protected the plywood completely. *Author's summary.*

1290. PLATH, E. Sonderfragen aus der Leimpraxis. **[Problems from gluing practice.]** *Holztechnik* 29 (10; 11; 12), 1949 (191–4; 213–6; 233–40). [G.] P.R.

Discusses: the preparation of the surface for gluing; the processes of gluing and pressing; tests of the glue-line, and its optimum thickness; the effect of pH of the glue; ageing; and the choice and properties of glues.

1291. [HARRIS, S. T.] **Glue control at point of use.** *Bull. Aero Res., Duxford* No. 89, 1950. pp. 4. *Repr.* of *C. F. Bulletin* No. 59, [Forest Products Research Society, Madison, Wis.] Nov. 1947. P.R.

1292. NARAYANAMURTI, D., and PRASAD, B. N. **The strip heating (low voltage) method of accelerating the setting of adhesives.** *Indian For. Leafl.* No. 115, 1948. pp. 7 + 5 photos, 38 gphs. Price *As.*14 (1*s.*3*d.*)

1293. GRAMELSPACHER, C. U. **Method of and device for moulding flexible sheets of wood or veneer.** *Brit. Patent* No. 606,201, Aug. 10, 1948. pp. 5 + 8 dgms. P.R.

Shapes a number of individual sheets of wood or wooden veneer or very flexible plywood into an article of predetermined configuration, applying a H.F. electric field to heat the adhesive material between the sheets.

1294. BERKEY, W. E., and NEWHOUSE, P. D. **Radio frequency heating as applied to furniture manufacture.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (337–43). 2 refs. P.R.

Tests were made on the R.F. assembly of 8 types of joint, and results, showing optimum heating times and electrode voltages, are tabulated. The costs of R.F. gluing are discussed and figures given for initial investment and operating cost.

1295. CUNNINGHAM, J. B. **Radio frequency application problems of furniture manufacturers.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (381–9). P.R.

Describes and illustrates the application of various R.F. gluing techniques used by different furniture manufacturers.

1296. BOOTH, F. L. **Manufacturing laminated office furniture.** *Veneers & Plyw.* 44 (5), 1950 (20, 22). P.R.

1297. Étude sur les assemblages collés dans la menuiserie. **[Investigation of glued jointings in joinery.]** *Étude tech. Inst. nat. Bois* No. 3, 1950. pp. 7 + 2 dgms. + 6 gphs. [F.f.] P.R.

Results are given of deformation tests carried out with various kinds of glued wood jointings (mortise-and-tenon, secret dovetailing, internal

bracket, pinned mortise-and-tenon). A relative stabilization has been observed 2–3 months after the application of a constant load. After 6 months the wood undergoes more serious changes than the glued joints.

33.16. Wood-wool (Excelsior) Manufacture

1298. Étude sur l'utilisation de la fibre de bois pour l'emballage. **[Investigation on the use of wood-wool for packing.]** *Étude tech. Inst. nat. Bois* No. 1, 1950. pp. 10 + 2 gphs. [F.] P.R.

Pioneer study of the shock-damping properties of wood wool, including sections on: description of the method, blank tests, tests with a varying number of fibres, comparative tests (wood wool, hay, straw), fatigue tests. It was found unnecessary to increase the thickness of packing material indefinitely to obtain efficient protection. The effects of 'fatigue' and lumping of this material play a considerable role.

33.17. Sawmilling and Machine Planing

1299. CHARDIN, A. Le sciage des bois tropicaux dans le sud Viet-nam. **[The sawing of tropical timbers in southern Viet-nam.]** *Bois For. Trop.* No. 14, 1950 (149–62). [F.]

1300. HUTCHISON, A. J. **Layout and design of sawmills.** *Aust. Timb. J.* 16 (3), 1950 (197, 199–200, 224).

1301. TURNBULL, R. F., and COLWELL, S. J. **Timber conveying in the sawmill.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 179, 1949 (1–3).

The following facilities and devices are suggested for use in Australian sawmills: sloping skids, lift trucks (comparing favourably with trucks on rails), rolls (for carrying timber lengthwise), belt conveyors and chains.

1302. REINEKE, L. H. **Saw teeth in action.** *Prepr. U.S. For. Prod. Res. Soc.* No. 130, 1950. pp. 16. 1 ref. P.R.

Describes the Forest Products Laboratory Duo-Kerf experimental saw.

1303. KRAMER - DRAUBERG, O. Das Kräftespiel im Vollgatter. **[The play of forces in the multiple blade frame saw.]** *Mitt. öst. Ges. Holzforsch.* 2 (3), 1950 (10–7). [G.] P.R.

1304. DUNSMORE, F. L. **Technique of woodworking machinery (8). Inserted tooth saws.** *Ill. Carp. Build.* 129 (3798), 1950 (936, 938). P.R.

1305. KUTTIS, N. **New devices improve on to-day's sawmilling methods.** *Timber of Canada* 10 (10), 1950 (30–2).

(1) Describes a process of slabbing logs to cants by means of additional saws, thereby enabling all sizes of log to be sawn in the gang saws at the same time and eliminating the necessity for log sorting; and (2) gives a brief account of the Swedish circular saw known as ATI Rip and Resaw.

1306. REINEKE, L. H. **Taming the saw.** *Repr.* from *Wood, Chicago* May, 1950. pp. 3. P.R.

A controlled-cut type of circular saw is described, designed in Germany and manufactured in Switzerland, with special features to reduce the danger of kickback. The back of the saw tooth is so designed as to limit the maximum cut per tooth, and there is an unusually small number of teeth, giving greater rigidity to the blade. The fewness of teeth in a cut reduces their lifting effect, and there is no danger that stock fed into the rising side of the saw will be whipped from the hands. Laboratory tests were made at Madison in which the force of the kickback from pieces of wood was measured by measuring the angle of maximum swing of a plywood panel suspended in front of the saw table. Controlled-cut saws and conventional American saws of the same gauge and diameter were used alternately on the same arbor at the same speeds for each test. Results showed that in nearly all conditions the controlled-cut saw is very much safer. The smaller number of teeth makes it very much quieter than the conventional saw. Its advantages are greatest on hand-feed saw benches where high feed rates are not used. [Cf. *For. Abstr.* 12 (No. 487).]

1307. Förslag till standard för cirkelsågblad. **[Proposal for standardizing circular-saw blades.]** *Pap. ja Puu* 32*B* (4*a*), 1950 (77–8). [Fi.Sw.] P.R.

Describes, with diagrams, proposals made by the standardization committee for blades for sawmilling, joinery and the veneer industry.

1308. Entretien des lames de scies circulaires. [**Maintenance of circular saw blades.**] *Broch. docum., Inst. nat. Bois* No. *DOC.* 1948–001 (2nd ed.), 1948. pp. 7 + 4 dgms. [F.] P.R.

Instructions for the proper tensioning and planishing of circular saw blades.

1309. DUNSMORE, F. L. **Technique of woodworking machinery (9). How to test saws.** *Ill. Carp. Build.* 139 (3800), 1950 (1016, 1018). P.R.

The procedure for testing the proper tensioning of circular saws is described.

1310. SUFFERT-BURNER, F. **Machine for the manufacture of small parquet floor-blocks.** *Brit. Patent* No. 638,367, June 7, 1950. pp. 4 + 9 dgms. P.R.

1311. BRUCE, D. **Use of photos in log studies.** *Timberman* 51 (6), 1950 (40–2, 43). 30 photos. [Mason, Bruce and Girard, Consulting Foresters, Portland, Ore.]

Describes and illustrates the use of photography in an investigation of the lumber grades produced by old-growth Douglas Fir logs of different types. Both ends of the log were photographed after having a small section sawn off, and were then sprayed with paint, various colours being used in order to be able to identify all pieces cut from the same log. When the log was loaded on the carriage 8 more pictures were taken, 4 to cover the exterior surface and 4 of the corresponding inside appearance after the slab and one or more additional cuts had been removed. It is considered that a study of such photographs may be of great value in training men to recognize the value of sawlogs from their appearance, and that the method may permit a closer evaluation of profits from a particular type of log.

1312. WRIGHT, G. W., and ROBERTS, H. D. **Project U.9. Progress report No. 16. Experiment U.9/10. Third report. The milling of 'Ash' Eucalypts in the Christensen and Crozier portable log edger saw mill.** Div. For. Prod., Commonw. sci. industr. Res. Organ., Aust. 1950. pp. 16. P.R.

Discusses the results of production and time studies carried out in Victoria on logs of relatively small girth. *From authors' summary.*

1313. SUSMEL, L. Le perdite di segagione. [**Sawing losses.**] *Ital. for. mont.* 5 (2), 1950 (48–59). [It.f.g.]

A study was made to determine: (1) the total amount of waste in sawing, P, made up of the following fractions:—volume of sawdust p_{se}, volume of slabs p_{sc}, and volume of edgings p_{ri}; and (2) the variations of P according to the variation of kerf width a, coefficient of taper k, average thickness of planks s_m, and usable top diameter of log d. The products considered were (i) waney or unedged planks, (ii) planks without wane but not parallel-sided, (iii) parallel-sided planks, and (iv) squared timber. It was found that d varied from 17 to 35 cm. for logs converted to (i) and (iv), and 25 to 50 cm. for logs converted to (ii) and (iii). Mean values of a and k were fairly constant at 3·2–3·5 mm. and 1 cm./linear m. respectively.

For constant values of k and a, P varied from 20 to 29% for (i), 27 to 41% for (ii), 30 to 41% for (iii), and 38 to 42% for (iv). The value of P depends principally on the values of d and of s_m but more on s_m than on d. Taking p_{sc} as unity, the proportional losses of various kinds may be expressed as follows:—for (i), $p_{ss} : p_{se} = 1 : 1{\cdot}5$; for (ii) and (iii) $p_{sc} : p_{ri} : p_{se} = 1 : 2 : 4$; and for (iv) $p_{sc} : p_{ri} : p_{se} = 1 : 4{\cdot}5 : 2{\cdot}5$.

The mean value of P was 21·5% for (i), 29% for (ii), 31% for (iii), and 37% for (iv).

1314. **Pond saw collects own sawdust.** *Timberman* 51 (6), 1950 (60).

A new type of electric pond saw, which automatically cleans up 90% of its own sawdust when cross-cutting logs in the pond, is to be manufactured by Monarch Forge and Machine Works of Portland, Ore. A box below the chain-saw housing receives the sawdust as the chain cuts through the log. As the box is immersed in the water, the water enters and mixes with the sawdust, acting as a carrying agent. An auger pump pulls the mixture back through the housing into the exhaust receiver beneath the motor. A 4½-in. hose attached to the exhaust end of the pump, carries the watered sawdust to the waste-conveyor chain where the water is drained and the sawdust conveyed to the burner. The inventors claim that the saw will prevent pollution of lakes and streams used as log ponds and will much reduce the work of dredging and cleaning private log ponds.

1315. WILSON, S. E. **Decimal cube calculator and ready reckoner for computing the contents of sawn timber, etc., in cubic feet, and for finding the value to the nearest penny, of any quantity at any price per cubic foot.** Arbor Press Ltd., Clevedon, Somerset. 1949. pp. 158. Price £1.5*s*. (+ 9*d*. postage).

33.19. Other Forms of Mechanical Conversion

1316. COREY, W. S., WATT, A. B., and WATT, R. B. **Wood slicing machine.** *U.S. Patent* No. 2,493,914, Jan. 10, 1950. pp. 4 + 3 dgms. 3 refs. P.R.

Describes a device for cutting blocks of wood into pieces suitable for fuel.

33.3. *Chemical Treatment*

Use of Wastes

See also *For. Abstr.* 12 (No. 1247).

1317. ARIES, R. S. **Research on lignin as a soil builder.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 32, 1950 (45–53). P.R.

Includes a chapter on the structure of lignin. Describes experiments carried out at Seabrook Farms, Bridgeton, N.J., in which (*a*) basic Ca lignosulphonate, and (*b*) a partially hydrolysed sawdust, were applied to a soil in pots at different rates per acre. Small-seeded Lima beans were planted in the pots. At first, a very hard crust was formed on soils treated with (*a*); after rains the crust disappeared and the soil became easily permeable to water. In this respect, lignin proved to be more efficient than sawdust. With the increase of lignin content in the soil, the yield of Lima beans reached a maximum at about 5 tons per acre, and then decreased, remaining above the control; the yield from (*b*) was less improved. When evaluating the influence of lignin or sawdust on yield, one has to bear in mind that (1) large quantities of Ca lignosulphonate raise markedly the pH of the soil, while (2) large quantities of sawdust bring about an unbalanced C/N relationship. It has also been found that sulphite lignin considerably increases the wettability of the soil, an addition of 10 tons of sulphite lignin per acre reducing by 99% the time necessary for water to infiltrate.

1318. **Tall oil abstracts with particular reference to some end uses.** *Tappi* 33 (1), 1950 (76*A*–82*A*). L.S.

Abstracts of 148 articles and patents published in Europe and North America since 1917.

33.32. Pulp and Paper Manufacture. Wallboards. Plastics

See also *For. Abstr.* 12 (No. 1247).

33.32.1. *Pulp Manufacture*

See also *For. Abstr.* 12 (No. 1220).

1319. KLEMM, K. H. Holzschliff und Holzzellstoff als Grundrohstoffe bei der Papiererzeugung. [**Mechanical and chemical wood pulp as principal raw materials in the manufacture of paper.**] *Papier, Darmstadt* 4 (1/2), 1950 (6–16). 16 refs. [G.g.] L.S.

Discusses the possibility of substituting groundwood for part of the chemical pulp in the manufacture of paper. It is suggested that a partial substitution of this kind would save at least ⅛ of the total wood requirement of the paper industry without detriment to paper quality.

1320. BROWN, K. J., and MCGOVERN, J. N. **Production of high-yield pulps from Aspen [*Populus tremuloides*] by mild treatments with sodium hydroxide.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1774, 1950. pp. 6 + 6 gphs, 2 tbls. P.R.

The optimum treating condition from the standpoints of the treating variable, pulp yield, and pulp strength was a 2-hour treatment at 25° C. with NaOH solution having a concentration of 24 g. per litre. Chemical consumption for this treatment was *ca.* 5·5% NaOH, based on the weight of the wood, and a pulp yield of *ca.* 91%. *From authors' summary.*

1321. BRANDTS, T. G. Overzicht van de semichemische beredingsmethoden van celstof. [**Survey of semichemical pulping methods.**] *Vlugschr. Bosbouwproefsta. Buitenzorg* No. 5, 1950. pp. 9. 15 refs. [Du.jav.e.]

Result of a study of the literature dealing with the augmentation of yield in the manufacture of pulp, the inclusion of hardwoods and, particularly, the semi-chemical processes. The acid and neutral sulphite, the sulphate, and the

soda process are described, together with properties of the pulps obtained.

1322. Halvkjemisk masse: en oversikt over mulighetene for produksjon i Norge. [**Semi-chemical pulp: a review of the possibilities of manufacturing it in Norway.**] *Rapport, Studieselskapet for Norsk Industrie, Oslo* 1948. pp. 116 + 1 map. Many refs. [Nor.] P.R.

Contains sections on: handling of the wood before cooking, cooking processes, handling of the pulp, and the significance of semi-chemical pulp in Norway, with an appendix containing reports on different processes, some of which, from the U.S.A., are in English.

1323. KLEM, G. G. **Specific gravity of Spruce wood, its variation in wood structure and pulp degree of delignification (Sieber chlorine no.), and the effect of these factors on yield and sulphite pulp quality** [: with a supplement by Ø. Nissen, G. G. Klem, and O. Karlsen]. *Norsk Skogind.* 4 (4), 1950 (78–89). [E.nor.] P.R.

The following conclusions were drawn from pulping experiments on *Picea abies*: (1) Pulp yield and pulp qualities are related to sp. gr. of the wood and to the degree of delignification. The yield decreases with lower Sieber chlorine numbers, and with increasing sp. gr. when the chlorine number is constant. All strength properties decrease with increasing sp. gr. and decreasing chlorine number, except tearing strength, which does the opposite. There is no significant correlation between other pulp properties and the chlorine number or sp. gr. (2) When narrow-ringed heartwood and broad-ringed sapwood were pulped separately or in mixture, the yield and qualities of the pulp corresponded to the average sp. gr. and did not appear to be influenced by the mixing of the 2 qualities of wood. Too few experiments were made for the result to be considered conclusive. (3) Thinnings from stands on good sites gave satisfactory yield and properties of sulphite pulp. Results are tabulated. A new method of statistical analysis for the data involved is described in a supplementary note.

1324. ZAPPERT, K. O aproveitamento do Pinho do Paraná na fabricação de celulose e papel. [**The use of *Araucaria angustifolia* in pulp and paper production.**] *Brasil madeireiro* 6 (60), 1950 (45–6). [Port.]

Methods and products of the Monte Alegre factory of the Companhia Industrias Klabin of Parana.

1325. Possibilidades da indústria brasileira de celulose e papel. [**Possibilities for the Brazilian pulp and paper industry.**] *Brasil madeireiro* 5 (58), 1949 (17–8). [Port.]

Reports briefly on experiments in kraft pulping of Parana Pine [*Araucaria angustifolia*]. A pulp yield of 52% calculated on dry weight of wood was obtained. Properties of the paper are listed. The tests were made by the Instituto Nacional de Tecnologia in collaboration with the Instituto Nacional do Pinho. [Cf. *For. Abstr.* 11 (No. 2044).]

1326. LEWIS, H. F., WISE, L. E., and BROWNING, B. L. **The characteristics of unbleached kraft pulps from Western Hemlock, Douglas Fir, Western Red Cedar, Loblolly Pine, and Black Spruce. I. The chemical constituents of the unbleached kraft pulps.** *Tappi* 33 (2), 1950 (92–4). 3 refs. L.S

The results of chemical analyses fail to show significant chemical variations between the constituents of pulps from the 5 species that might account for the differences in physical properties. The lignin contents are approximately the same. The Spruce pulp shows the lowest corrected α-cellulose content. Spruce and Fir have similar mannan contents, with Hemlock intermediate. Fir and Hemlock pulps have the same uronic anhydride, and the lowest pentosan (xylan) contents. *From authors' summary.*

1327. GRAFF, J. H., and ISENBERG, I. H. **The characteristics of unbleached kraft pulps from Western Hemlock, Douglas Fir, Western Red Cedar, Loblolly Pine, and Black Spruce. II. The morphological characteristics of the pulp fibers.** *Tappi* 33 (2), 1950 (94–5). L.S.

Data for the fibre length and width of unbleached kraft pulps.

1328. HOLZER, W. F., and BOOTH, K. G. **The characteristics of unbleached kraft pulps from Western Hemlock, Douglas Fir, Western Red Cedar, Loblolly Pine and Black Spruce. III. The comparative pulping of the woods.** *Tappi* 33 (2), 1950 (95–8). L.S.

Both kraft and sulphite pulps were prepared. In kraft pulping Hemlock was the slowest pulping species, Eastern Spruce pulped quite easily, and the others were intermediate. Hemlock, Spruce and Pine yields were similar, while Fir and Cedar gave much lower yields. Eastern Spruce had shorter fibres, the length of fibres of the 4 other species being similar. Cedar pulp gave the highest bursting strength, followed closely by Spruce and Hemlock, with Douglas Fir and Loblolly Pine giving lower values. The order of decreasing tear resistance was the reverse of the bursting strengths. In sulphite pulping Ca-base acid was used for Cedar, Hemlock and Spruce, but Na-base acid was necessary for the other species to prevent burning. Yields of pulp were substantially the same. Fibre classifications were similar for all pulps (Spruce had shorter fibres). The orders of decreasing bursting and tear strengths were nearly the same as in the kraft pulps. *From authors' summary.*

1329. BROWNING, B. L., and BAKER, P.S. **The characteristics of unbleached kraft pulps from Western Hemlock, Douglas Fir, Western Red Cedar, Loblolly Pine, and Black Spruce. IV. The specific surface areas of the pulps and the changes on beating.** *Tappi* 33 (2), 1950 (99–101). 2 refs. L.S.

After 5 and after 50 minutes of beating, the pulps having the lowest bursting-strength values showed the lowest specific surface areas. Arranged in order of increasing specific surface and bursting strength, the pulps are: Fir, Pine, Hemlock, Spruce, and Cedar. *From authors' summary.*

1330. HEUSER, E., SHOCKLEY, W., and KJELLGREN, R. **The characteristics of unbleached kraft pulps from Western Hemlock, Douglas Fir, Western Red Cedar, Loblolly Pine, and Black Spruce. V. A study of the distribution of the degree of polymerization of the cellulose in the kraft pulps.** *Tappi* 33 (2), 1950 (101–7). L.S.

The average chain length and the chain-length distribution have been determined for the kraft pulps obtained from the five species by methods involving fractionation by solvent extraction. Eastern Spruce pulp closely resembles Douglas Fir pulp, while pulp from Loblolly Pine is similar to those from Western Red Cedar and Western Hemlock. *From authors' summary.*

1331. CLARK, G. L. **The characteristics of unbleached kraft pulps from Western Hemlock, Douglas Fir, Western Red Cedar, Loblolly Pine, and Black Spruce. VI. The orientation of cellulose chains in pulp fibers as measured by X-ray diffraction.** *Tappi* 33 (2), 1950 (108–10). 1 ref. L.S.

The order of decreasing preferred orientation is: Douglas Fir, Spruce, Cedar, Hemlock, and Loblolly Pine. *From author's summary.*

1332. HOLZER, W. F., and LEWIS, H. F. **The characteristics of unbleached kraft pulps from Western Hemlock, Douglas Fir, Western Red Cedar, Loblolly Pine, and Black Spruce. VII. Comparison of springwood and summerwood fibers of Douglas Fir.** *Tappi* 33 (2), 1950 (110–2). 2 refs. L.S.

Springwood pulp is characterized by a high bursting strength, low tear and considerable cutting of the fibre in beating. Summerwood pulp is characterized by a low bursting strength, high tear, and mild fibrillation in beating. Specific surface of springwood is initially high, changes little during most of the beating, then increases rapidly. Summerwood pulp has a low specific surface initially which increases regularly with beating to values higher than those of springwood. *From authors' summary.*

1333. MURTO, J., and ITKONEN, J. Southern Pine ja sen käyttö sulfaattiselluloosateollisuuden raaka-aineena. [**Southern Pine and its use as raw material in the sulphate pulp industry.**] *Pap. ja Puu* 32*B* (4), 1950 (108–23). Many refs. [Fi.e.] 6 photos. [Centrallaboratorium Ab, Helsinki.] P.R.

The properties of Southern Pine and its pulp-making qualities are compared with those of Finnish Pine. Results are given in graphs and tables with English captions. The density of Southern Pine is over 10% greater than that of *P. sylvestris* grown in Finland, and the yield of pulp calculated on volume is therefore greater; the yield of sulphate pulp calculated on the dry weight of the wood is also slightly greater from Southern Pine, possibly because the resin content is lower. Yields of crude tall oil and turpentine are similar to those from Finnish mills. The special properties of

Southern Pine kraft pulps are attributed to the greater length of the tracheids and thickness of the walls of the late-wood tracheids, and also to the high content of late wood as compared with Finnish Pine.

1334. PATETTA, J. J., KUMAGAY, A., VAY, F., RUBI, J., and CAPO, A. **Study of Paraguayan cane as a raw material for paper pulp.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (8, 91–105). P.R.

A thorough study of cooking conditions for the sulphate pulping and bleaching of Cana Picanilla (*Guadua paraguayana*) was made. The raw material can be cooked without difficulty and gives good yields of excellent pulp. Results are tabulated.

1335. HOLINGREN, H., VAY, F., RUBI, J., and CAPO, A. **Cellulose production from *Eucalyptus saligna* by the sulphate process.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (8, 106–10). P.R.

Sulphate cooks of *E. saligna* were carried out under various conditions. Yields of unbleached cellulose ranged from 69·0 to 37·3%, those of bleached cellulose from 44 to 35%. The pulps of higher brightness were very suitable for paper pulps; they were easy to bleach and their consumption of alkali and Cl was no. mal.

1336. LETHLEAN, H. V. **Production of mechanical pulp from Eucalypt wood.** *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 3, 1949 (1–13). P.R.

Discusses the grinding process in general and compares the grindability of softwoods with that of hardwoods, with particular reference to wood density variation in Eucalypts. *From author's summary.*

1337. RUNKEL, R. O. H. Über die Herstellung von Zellstoff aus Holz der Gattung *Eucalyptus* und Versuche mit zwei unterschiedlichen *Eucalyptus*-arten. **[Preparation of pulp from *Eucalyptus* and experiments with two different *Eucalyptus* species.]** *Papier, Darmstadt* 3 (23/24), 1949 (476–90). 224 refs. [G.g.] [Zentralinstitut für Forst- und Holzwirtschaft in Reinbek (Bez. Hamburg).] L.S.

Information on the properties and use of *Eucalyptus* spp. in pulping is summarized. Experiments on two unidentified species of *Eucalyptus*, T.30, one of the 'light brown' group (containing little wood parenchyma), and T.26, one of the "red" group (much wood parenchyma, deep in colour), are described and the results are tabulated. The two species showed considerable morphological and pulping differences. T.30 was more readily pulped than T.26, but needed longer beating to give maximum breaking length and folding strength.

1338. JAYME, G. **Pulp characteristics influencing paper strength properties.** *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 3, 1949 (432–78). 22 refs. [Technical University, Darmstadt.] P.R.

The fibre length of Australian Eucalypt woods was found to be higher than that of European Beech, but lower than that of European Black Poplar hybrids. Fibre length determines the tearing resistance; thickness of cell wall affects all strength properties. It has been proved that the degree of polymerization of cellulose in pulps should be as high as possible, and methods are given for obtaining such a high degree of polymerization. The biostructure of fibres plays an important rôle during the mechanical beating process, resistance to which is directly proportional to the degree of preservation of the primary wall.

1339. VILLIÈRE, A. **Studies on the influence of certain anatomical and physical properties of woods on the qualities of paper pulps.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (7, 66–86). 4 refs. [Chemical Division, French Forest Products Laboratory, Paris.] P.R.

Anatomical and physical examinations and chemical analyses were made on the early and late wood of Scots Pine, and pulping tests on the early and late wood and the wood as a whole. Tests on pulp properties showed that: (1) figures for breaking length and folding strength were higher for thin-walled (early wood) and those for tearing strength were higher for thick-walled fibres, although the fibre length was the same for both classes; (2) results for the wood as a whole corresponded to properties intermediate between those of early and late wood; (3) figures for breaking length and folding strength tended to increase and those for tearing strength to decrease with

the period of refining. Similar results were obtained with Maritime Pine. Further anatomical and physical examinations and pulping tests were made on Poplar and Beech separately and in mixture, and on Scots Pine. The density of Poplar and Beech approximating respectively to that of the early and late wood of Scots Pine, the 2 species were pulped together in proportions of 3 : 7 by weight, i.e. the proportions of early to late wood in Scots Pine. The following results were obtained: (1) Beech pulp was inferior to that of Pine, having low breaking length and tearing strength; (2) pure Poplar gave satisfactory pulp, generally equal or superior to that from Scots Pine; (3) mixed Beech and Poplar gave pulp with properties intermediate between those of the pure pulps; the breaking length corresponded very closely to that of Pine pulp cooked under the same conditions. Experiments with pure hardwood species (Beech, Hornbeam, Birch, Lime and Poplar) showed that species with thin-walled fibres (Lime and Poplar) gave a rather better breaking length than the others; experiments with mixed species in different proportions showed again that the properties of the mixed pulp were intermediate between those of the pure pulps of the same species, and that species could be selected to give good results in mixture. Pulping experiments were made on Beech and Birch, using different processes. The results for Birch were better than those for Beech, because of the former's thinner cell walls and longer fibres. However, satisfactory results could be obtained from either species by choice of a suitable process. In general, better bleached pulps were obtained by semi-chemical and better unbleached pulps by chemical processes. Results of the different experiments are tabulated.

1340. Influence des caractéristiques anatomiques et physiques des bois sur la qualité des pâtes papetières. **[Influence of anatomical and physical characteristics of wood on the qualities of papermaking pulps.]** *Rapp. Lab. Inst. nat. Bois* 1948–9 (77–99). 4 refs. [F.] P.R. Cf. preceding abstract.

1341. THOMAS, A. V. **Prospects of pulp production in Malaya.** *Malay. Forester* 13 (2), 1950 (75–9). 3 refs.

The most likely source of raw material for pulp would be plantation-grown Batai (*Albizzia moluccana*).

1342. ÅLANDER, P., and FOGELBERG, B. C. Synpunkter beträffande torrhaltsprovning och användning av elektrisk fuktighetsmätare i samband med denna. **[Testing wood pulp for moisture content and the use of electrical moisture meters.]** *Pap. ja Puu* 32 (6), 1950 (157–67). 21 refs. [Sw.e.] [Centrallaboratorium Ab., Helsinki.] P.R.

Different methods of determining the moisture content are discussed.

33.32.3. *Wallboards, Fibreboards, etc.*

1343. NARAYANAMURTI, D., and DAS, N. R. **Studies on building boards. Part IV. Utilization of tree barks.** *Indian For. Leafl.* No. 118, 1949. pp. 5.

Results of chemical analysis of Sal (*Shorea robusta*) and *Eucalyptus* barks, and of tests of thermal conductivity on Teak bark and the fibres of betel-nut husks, are tabulated. Preliminary experiments (results of which are tabulated) indicate that satisfactory building boards can be made from the barks of *Shorea robusta* and *Eucalyptus* species with and without the addition of resins, waste liquor, etc. Further work is in progress.

1344. NARAYANAMURTI, D., RANGANATHAN, V., and BIST, B. S. **Studies on building boards. Part III. Boards from wood shavings and sawdust.** *Indian For. Leafl.* No. 110, 1948. pp. 7.

Describes the results of experiments in the manufacture of wood-wool/cement boards, wood-wool protein boards, and various types of hard board. Hard boards made from sawdust with a small percentage of groundnut protein and resin as a binder compared favourably with foreign boards. Some woods (e.g. *Mangifera indica* and *Boswellia serrata*) gave trouble in the manufacture of wood-wool/cement boards, but this was overcome by pretreatment of the wood wool by boiling or soaking.

1345. THURMANN-NIELSEN, E. Foredling av sagflis: en undersøkelse av mulighetene for fremstilling av plater og lignende produkter. **[The utilization of sawdust: an investigation into the production of building boards and similar products.]** *Rapport, Studieselskapet for Norsk Industrie, Oslo* [1948?] pp. 10. [Nor.] P.R.

Existing processes from England, U.S.A., Germany and Scandinavia, using synthetic resins, proteins, and lignin as binders, are described. Results of laboratory tests using different binders are given in graphs and tables; urea resin, blood albumin, and a lignin from sulphite waste liquor, gave the best result. Reports from commercial firms and research laboratories in these 4 countries are given in the appendix in their original language; also a list of patents with brief abstracts in Norwegian.

1346. Essais de fabrication de panneaux plans ou objets moulés à base de déchets de bois: (sciure ou copeaux). [**Experiments in manufacturing flat panels and moulded objects from wood waste: (sawdust or shavings).**] *Rapp. Lab. Inst. nat. Bois* 1948–9 (69–76). 10 refs. [F.] P.R.

The manufacture and costs, using synthetic-resin and lignin binders, are discussed.

1347. Sears, T. W. **Variables affecting the properties of wood waste moulding.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 31, 1950 (89–105). P.R.

Experiments were made on panels with fillers of hardwood (a mixture of Oak, Maple and Birch) and softwood (Ponderosa Pine) sawdust, to determine the effect of resin content, moisture content and moulding pressure, on flexural strength, water absorption and density. Type of resin and time/temperature cycles for pressing were constants. In the same manufacturing conditions, softwood panels had better physical properties than hardwood panels. Higher-density panels were obtained when softwood fillers were used, and the physical properties of both types of panel improved as the density increased. Adjustment of any one variable, or a lesser degree of adjustment of 2 or all 3 of the variables, will produce hardwood panels with properties equal to softwood ones.

1348. Baird, P. K. **Effect of molding temperature on the strength and dimensional stability of hardboards from fiberized water-soaked Douglas-Fir chips.** *Prepr. U.S. For. Prod. Res. Soc.* No. 127, 1950. pp. 5. 18 refs. P.R.

It was shown that Douglas Fir hardboard prepared from pulps produced by fiberizing water-soaked chips can be dried and heat-treated in one short operation in a hot press at temperatures above 200° C. Hardboard so produced has a higher modulus of rupture and a better dimensional stability than that produced at lower temperatures. *From author's summary.*

1349. Blumenstein, R. R. **How to evaluate hardboard.** *Wood, Chicago* 5 (8), 1950 (27–9, 38–9). P.R.

Gives a review of manufacturing methods, properties (appearance, strength, tension, nail- and screw-holding, water absorption, linear expansion, accelerated ageing) and their evaluation.

1350. Kleeck, A. van, and Martin, T. J. **Evaluation of flame-spread resistance of fiber insulation boards.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1756, 1950. pp. 12 + 5 photos, 1 dgm., 4 gphs., 5 tbls. 1 ref. P.R.

33.34. Dyeing and Bleaching of Wood

1351. Zumbrunnen, F. **Wood-bleaching process.** *Swiss Patent* No. 257,801, Apr. 1, 1949. *Chem. Abstr.* 44 (8), 1950 (3712). P.R.

The natural appearance of weathered wood surfaces may be restored by brushing the surface with a 15% solution of H_2O_2 containing 5% H_2SO_4. The bleached surface is then washed with H_2O.

1352. Wulf, H. Werkstoffe und Technik des Holzbeizens. [**Raw material for, and technique of, staining wood.**] *Farbe und Lack, Hannover* 56 (1), 1950 (21–3). [G.] L.S.

Discusses various methods of staining wood, viz. physical (dye) methods (water, spirit, salammoniac, oil, and wax stains), and chemical methods, as well as the technique of staining (preliminary treatment, staining proper, after-treatment, and repeated treatment).

33.36. Wood Finishes. Preservation of Wood. Seasoning and Drying

See also *For. Abstr.* 12 (No. 1209).

1353. Rischbieth, J. R., Sinclair, R. M., Bussell, K. R., and Gunning, R. H. **The paint-holding properties of Australian timbers.** *Paint Notes, Maribyrnong, Victoria* 5 (3), 1950 (67–83). 6 refs. P.R.

An interim report on the results of two years' tests with the following Australian timbers: *Araucaria cunninghamii, Eucalyptus marginata, E. pilularis, E. regnans, E. maculata* group, *Callitris glauca, Pinus radiata.* A range of painting systems was tested on each. Results are compared in respect of paints, primers and timbers (species, type of surface, and density).

1354. KENNEDY, P. S.; SMITH, W. T. **Two slants on postwar wood finishing. I. Current practice. II. Suggested method for predicting check resistance of lacquer films.** *Trans. Amer. Soc. mech. Engrs.* 72 (2), 1950 (165–73). P.R.

Discusses the advantages of using fillers of a new type, employing various synthetic vehicles instead of linseed oil, and gives a comparison between lacquer and varnish finishes. In the second part details are given of equipment and technique for performing control tests on film-forming materials. Typical tests are interpreted and correlated, and illustrated examples are given of test results on various lacquers. *From authors' summary.*

1355. Protection des bois: produits hydrofuges, peintures, vernis. [**Wood preservation: water-resistant products, paints and varnishes.**] *Rapp. Lab. Inst. nat. Bois* 1948–9 (47–9). [F.] P.R.

Six commercial water-resistant products were applied to Beech, and treated specimens with untreated controls were kept in a moist atmosphere for 29 days and in a dry atmosphere for 43 days. All the products reduced the shrinkage of the wood, 'Permatox WR' and 'Pen a seal' giving the best results. Similar results were obtained with specimens soaked in water. Similar tests were made using 36 water-resistant products, paints and varnishes. Results are shown in a graph.

1356. Essais particuliers sur le 'Balsa'. [**Special experiments on Balsa.**] *Rapp. Lab. Inst. nat. Bois* 1948–9 (50–1). [F.] P.R.

Two preparations based on a urea-formaldehyde synthetic resin gave good results in hardening the surface of Balsa, when 2 or 3 coats were applied. Paints with a bitumen base and varnishes with a bakelite base greatly reduced the absorption of water by Balsa. Unsatisfactory results were obtained when paint or varnish was applied on top of the hardener; the latter has a tendency to crack when immersed in water for any length of time.

1357. BERTHOUD, R. P. **Product for preserving wood, particularly floors.** *Swiss Patent* No. 260,084, July 1, 1949. *Chem. Abstr.* 44 (6), 1950 (2770). P.R.

Contains shellac, and a vinyl resin, in MeOH, amyl acetate and turpentine.

1358. HAGER, J. A. **Evaluating furniture finishes.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (126–32). P.R.

1359. PERRET, G. Le bois madré. [**Figured wood.**] *Rev. int. Bois* 17 (155), 1950 (102–3). [F.]

A machine has been evolved whereby the grain of certain soft types of timber can be enhanced by (1) charring the surface by means of a gas jet, (2) cooling the wood immediately to avoid deformation, and (3) brushing the surface with a series of metal brushes. In the finished product the summerwood is darkened and stands out in relief and the surface of the wood has increased hardness and durability.

33.36.1. *Preservation against Attack by Plants and Animals*

See also *For. Abstr.* 12 (No. 1195, 1221, 1223–4, 1499, 1525).

1360. NOWAK, A. Holzschutz. [**Wood preservation.**] *SchrReihe öst. Ges. Holzforsch.* No. 1, 1950. pp. 71. [G.] P.R.

Includes sections on wood structure, preservatives and preservative methods, fireproofing and reduction of swelling.

1361. WAYMAN, P. **Reports of treatment methods committees.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 43. P.R.

Contains reports by Committees T–1 to T–8 on: revision of manual; proposed treatment of Southern, Jack, Ponderosa, Lodgepole and Norway Pines, Douglas Fir, Larch, Western Red Cedar, Western Hemlock, Oak, Ash, Locust, Hickory, Black Walnut, and Red and Black Gum; and the non-pressure treatment of poles.

1362. PEREZ, L. **Reports of recommended practice committees.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 28. P.R.

Contains reports of Committees R–1 to R–11 and includes (1) a report on the use of different

stains for determining the sapwood and heartwood of Douglas Fir, Western Larch and Hemlock; (2) proposed recommended practice for the preservative treatment of cross-arms; (3) proposals for standard recommendation on the use of pressure-preserved piles and timbers in marine construction; (4) a revised glossary of terms used in wood preserving; (5) proposed recommended practice for use of (*a*) pressure-treated wood blocks for flooring, and (*b*) pressure-preserved wood in millwork.

1363. MacLean, J. D. **Factors that have an important bearing on the preservative treatment of round timbers.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 8. [U.S. Forest Products Laboratory, Madison.] P.R.

Factors discussed include: temperature of the wood and of the preservative; pressures and periods of pressure; retentions; penetration requirements; service conditions; cost; relation of diameter, sapwood durability, and sapwood depth, to penetration and retention; treatment of different-sized timbers in the same charge; and relation of retention and penetration in timbers of different species.

1364. Fleischer, H. O. **An anatomical comparison of refractory and easily treated Douglas Fir heartwood.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 5. 3 refs. [U.S. Forest Products Laboratory, Madison.] P.R.

Two specimens of markedly different treatability were examined, after pressure treatment with Wolman salts in water solution by the full-cell process. In the more treatable specimen, tracheids were larger and had larger lumina, and there were more unaspirated pits. There is some evidence that these pits may have been aspirated at one time but that the passage to liquids may not have been so tightly sealed in the more treatable specimen. Ash examinations indicated that the treating salts were located chiefly in or on the cell walls, rather than in the cell cavities. The springwood elements were found to have a considerably better treatment than summerwood elements. [Cf. *For. Abstr.* 10 (No. 503).] *From author's summary.*

1365. Schulze, B., and Theden, G. Das Eindringen von Holzschutzmitteln. [**Penetration of wood preservatives.**] *Holzforschung, Berlin* 4 (3/4), 1950 (79–107). 52 refs. [G.] P.R.

Results are given of research work on: (1) penetration of oily and of aqueous preservatives in general; (2) penetration of superficially applied preservatives (brushing, spraying, dipping) and its dependence on air humidity and the amount of liquid used; (3) penetration of oily and aqueous preservatives applied in the trough impregnation process; and (4) penetration during diffusion impregnation. The tests were chiefly on Pine, but also on Spruce, sapwood (usually 10 × 5 cm. plates).

1366. Walters, S. **Cellulose acetate and adhesive end-coatings control preservative penetration.** *For. Note Ill. agric. Exp. Sta.* No. 17, 1950. pp. 2.

1367. Kenaga, D. L., and Sproull, R. C. **Flash treatment of timber in a high-frequency field as an aid to impregnation.** *Sth. Lumberm.* 181 (2263), 1950 (76, 78, 80, 82). 8 refs.

A brief account of experiments in improving the permeability of wood by placing it in an H.F. field before pressure treatment with a preservative. The tests were made with Southern Pine and Red Oak railway sleepers. It was thought that the internal heat generated might rupture the pit membranes or open the pores and thus facilitate impregnation. Judged on the basis of retention and penetration of preservatives, however, no such process took place and no increase in permeability was obtained.

1368. Deman, L. **Preserving wood and improving its resistance to mechanical operations.** *Belg. Patent* No. 480,457, Feb. 18, 1948. *Chem. Abstr.* 44 (10), 1950 (4628). P.R.

The dry wood is treated with a fatty substance at boiling point and the excess is removed by means of a solvent which facilitates the penetration of the wood by preservatives, such as creosote or tar.

1369. Pritchard, G. J. (to Ward, Blenkinsop & Co., Ltd.). **Preservation of timber.** *U.S. Patent* 2,503,841, Apr. 11, 1950. *Chem. Abstr.* 44 (12), 1950 (5520). P.R.

Salts of di-substituted methane compounds may be used for rot-proofing and preserving timber and lignified or cellulosic materials or

fabrics. Typically, an aqueous solution of phenyl Hg hydroxide is mixed with an aqueous solution of 2-naphthalene-sulphonic acid, and with formalin solution. The timber is treated in any convenient manner, with or without pressure.

1370. MANOL A.-G. **Wood preserving agents.** *Swiss Patent* No. 263,859, Dec. 1, 1949. *Chem. Abstr.* 44 (8), 1950 (3666). P.R.

Various modifications of a previous patent [cf. *For. Abstr.* 11 (No. 3066)] are described. Chemical resistance is given by adding to the impregnating material a chlorinated rubber or polyvinyl chloride, and protection against insects by adding DDT or 666.

1371. BAECHLER, R. H. **Reports of preservatives committees.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 41. P.R.

Contains reports by committees P–1 to P–6 on: revision of the manual, creosote and creosote/coal-tar solutions, petroleum solutions, non-standard preservatives, fire-retardant preservatives, and methods of evaluating wood preservatives.

1372. SCHULZE, B., THEDEN, G., and STARFINGER, K. Ergebnisse einer vergleichenden Prüfung der pilzwidrigen Wirksamkeit von Holzschutzmitteln. **[Results of a comparative examination of the efficacy of wood preservatives against fungi.]** *Repr.* from *Wissenschaftliche Abhandlungen der deutschen Materialprüfungsanstalten, Berlin* 2 (7), 1950. pp. 40. 43 refs. [G.g.] P.R.

The limiting values (amount of preservative just sufficient to prevent rotting, expressed either in % concentration of the impregnating solution or in kg./cu.m. of timber) of the efficacy of wood preservatives against fungi, obtained by the wood-block method at the Materialprüfungsamt Berlin-Dahlem, and the results of the leach test, are compared with data published by various authors since 1930. A series of inorganic (F, As, Se, Hg, Cu, and Zn compounds, and dichromate), organic non-oily (dinitro compounds, pentachlorophenol, etc.) and oily (coal-tar oil) preservatives were tested on Pine sapwood blocks.

1373. DUNCAN, C. G., and RICHARDS, C. A. **Evaluating wood preservatives by soil-block tests: (1) Effect of the carrier on pentachlorophenol solutions. (2) Comparison of a coal tar creosote, a petroleum containing pentachlorophenol or copper naphthenate and mixtures of them.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 15. P.R.

(1) The efficacy of pentachlorophenol against *Lentinus lepideus*, *Lenzites trabea* and *Poria monticola* is influenced by the carrier used. In general, the effectiveness of an oil as a carrier was correlated with the boiling point, the higher-boiling petroleums giving the best results. This did not hold for 2 high-viscosity petroleums which have a fairly high boiling point and were the poorest carriers. (2) A smaller amount of creosote plus pentachlorophenol than of any of the other preservatives was needed to inhibit attack; the next lowest was 5% pentachlorophenol, followed by a mixture containing 0·25% metallic copper (in the form of Cu naphthenate) and 2·5% pentachlorophenol in petroleum. Results of both are given in graphs and tables.

1374. BAGCHEE, K. **Toxicity tests by woodblock method.** *Indian For.* 76 (4), 1950 (156–8).

Experiments were conducted to test the toxicity of Cashew-nut shell oil against wood-rotting fungi, using *Polystictus sanguineus* as the test fungus. The experiments, which are described in some detail, gave somewhat anomalous results, but the net conclusion was that this substance, though effective against insects, is not a suitable preservative against decay fungi.

1375. HATFIELD, I. *et al.* **The unseasoned wood disc method for evaluating sap-stain control chemicals.** *Phytopathology* 40 (7), 1950 (653–63). 5 refs. [Monsanto Chemical Co., St. Louis, Miss., and Wyandotte Chemicals Corporation, Wyandotte, Mich.]

Discs cut from fresh sapling logs are immersed in an anti-stain solution for 15 seconds, sprayed with a spore/mycelium suspension of an individual sap-stain organism or with a mixture of organisms, and placed in incubation jars. Three weeks' incubation generally gives the most reliable results. Comparisons with tests made in sawmills in various parts of the U.S.A. showed good correlation between laboratory results and the sawmill tests.

1376. EADES, H. W., and ROFF, J. W. **Project V–54–2, progress report No. 1. Sap stain and mould prevention—the relative efficacy of certain chemicals.**

Mimeo. For. Prod. Lab., Can. No. *V*–1007, 1950. pp. 8 + 1 dgm., 8 tbls.

Tests were made to determine the efficacy of 7 proprietary chemicals, applied to Western White Pine, Douglas Fir and Western Hemlock, in preventing attack by *Trichoderma* and *Penicillium* moulds or by the blue-stain fungus *Ceratostomella* sp. Four of the compounds were satisfactory, 2 were fair and 1 was unsuitable. Results are tabulated.

1377. VERRALL, A. F., and MOOK, P. V. **Adsorption of sap stain and mold-control chemicals by wood.** *Industr. Engng. Chem.* 42 (7), 1950 (1350–5). 8 refs. P.R.

Loss in strength of aqueous solutions of fungicides in continuous dipping of green lumber, was determined by biological laboratory and field tests. A mercurial lost strength rapidly, a phenolate slowly, and mixtures of these with borax to an intermediate extent. Presumably loss in strength is due mainly to adsorption of the toxic solutes on wood fibres. Adequate strengths can be maintained most feasibly by keeping the solution in the dipping vat at a uniform level by frequent replenishing with solutions of usual concentration. [Cf. *For. Abstr.* 9 (No. 2427).] *Authors' summary.*

1378. **Marine borers and methods of preserving timber against their attack.** *Leafl. For. Prod. Res., Lond.* No. 46, 1950. pp. 7.

Describes several species of wood-boring salt-water Mollusca and Crustacea with particular reference to British waters, and methods of preserving timber against their attack.

1379. BECKER, G. Ergebnisse einer vergleichenden Prüfung der insektentötenden Wirkung von Holzschutzmitteln. II Teil. **[Results of a comparative investigation on the insecticidal effect of wood preservatives. Part II.]** *Repr.* from *Wissenschaftliche Abhandlungen der deutschen Materialprüfungsanstalten, Berlin* 2 (7), 1950 (40–62). 40 refs. [G.g.] P.R.

Completion of a previous paper [see *For. Abstr.* 10 (No. 1273)]. The toxic values and the duration of the toxic effect of wood preservatives against larger *Hylotrupes bajulus* larvae are given. New results relating to newly hatched larvae of this insect and to larvae of *Anobium punctatum* are also presented. Some correlation between the chemical structure and the efficacy of a series of wood preservatives is attempted.

1380. SNYDER, T. E. **Recent advances in termite and borer control.** *Pest Control* 18 (2), 1950 (12, 14). D.S.I.R.

Experimental control measures are described. A 10% solution of sodium arsenite used for spraying foundation walls was successful in clearing buildings infested with termites, but killed ornamental plants near the walls and young trees at some distance. A 2% Chlordane emulsion used as a soil poison against termites was found to be harmless to a wide range of vegetation including Rhododendron, Black Locust, Maple, Sycamore, Hemlock, Juniper, Pine, Spruce and Yew. Brick houses with interior woodwork infested with *Hylotrupes bajulus* were successfully fumigated with hydrocyanic gas, in concentrations of 2 and (for a lighter infestation) 1 lb./1,000 cu. ft.; the fumigation process is dangerous and safety precautions are described. Tests are to be made on the effect of (1) moist hot air, and (2) a fog containing a 2% solution of Chlordane in fuel oil, against *Hylotrupes bajulus* and anobiid beetles.

1381. BECKER, G. Prüfung der 'Tropeneignung' von Holzschutzmitteln gegen Termiten. **[Testing anti-termite wood preservatives for their suitability in the tropics.]** *Repr.* from *Wissenschaftliche Abhandlungen der deutschen Materialprüfungsanstalten, Berlin* 2 (7), 1950 (62–76). 37 refs. [G.g.] P.R.

Presents the results of tests on Pine sapwood blocks (5 × 2·5 × 1·5 cm.) using the standard German impregnation method under reduced pressure (DIN 52176). Whereas the preserving action of organic substances (creosote oil, carbolineum, etc.) was very markedly and rapidly reduced by artificially created hot and dry climatic conditions, the efficacy of water-soluble salts and mixtures of salts remained unimpaired under such conditions (certain fluorides and silicofluorides excepted). [Cf. *For. Abstr.* 9 (No. 1116).]

1382. CHATTERJEE, N. C., BHATIA, B. M., and CHATTERJEE, P. N. **Anti-termite characteristics of certain chemicals.** *Indian For.* 76 (6), 1950 (263–5). 1 ref.

In graveyard tests, specimens treated with creosote, with Borlac plus Na_2HAsO_3 (borax

2·6%, lac 7·9% and Na_2HAsO_3 4%, dissolved in water), with Rentokil Timber Fluid B, or with a solution of paraffin wax in kerosene oil, gave much longer service than untreated controls. In tests of natural durability *Cedrus deodara* resisted termite attack for 3 years, *Dalbergia sissoo*, *Heritiera minor* and *Terminalia tomentosa* for 1½ years, and *Mangifera indica* and *Cedrela toona* for 8 months.

1383. Coaton, W. G. H. **Infestation of buildings in South Africa by subterranean wood-destroying termites.** *Bull. Dep. Agric. S. Afr.* No. 299, 1949. pp. 89. 11 refs. (*Entomology Series* No. 30). Price 6*d*.

Rhinotermitidae are of little importance in South Africa; most of the damage is done by *Macrotermes* and *Termes* spp. A survey of the occurrence of the different species and the position of their nesting sites is given. Recommendations for their control are: (1) the use of 5% solutions of pentachlorophenol in furnace oil, or Na pentachlorophenate in water, as soil poisons; (2) nest eradication from the site before building; (3) good building construction; and (4) treatment of all timbers forming, or in contact with, ground floors. Two toxic smokes —666, and arsenic and sulphur—are excellent for destroying colonies of *Macrotermes* and *Termes* spp.

1384. **[Research on termites.]** *Rep. Commonw. sci. industr. Res. Organ. Aust.* 1949 (54).

Results of experiments by the Division of Entomology have again shown that pentachlorophenol is very effective against termites. An investigation on the comparative resistance to *Eutermes exitiosus* of 5 Australian commercial hardwoods has shown that the order of decreasing resistance is: *Tristania conferta*, *Eucalyptus acmenioides*, *E. microcorys*, *E. maculata*, *E. pilularis*. The first examination of soil-poisoning tests showed that both creosote and 5% pentachlorophenol (both used at the rate of 0·5 gal./cu. ft. soil) had given complete protection for 12 months, while lead arsenate and As_2O_3 (both at 2 oz./cu. ft.) had both failed. Additional tests were installed using 5% Na pentachlorophenate and 10% sodium arsenite (both at 0·5 gal./cu. ft.).

1385. Tamblyn, N., and Gordon, A. **Control of borer attack in plywood by use of preservatives in the glue.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 180, 1950 (1–2). 2 refs.

Toxic chemicals were added in different concentrations to cold-setting casein and urea glues, and plywood panels bonded with these treated glues were made from 3 species (*Schizomeria ovata*, *Sloanea woolsii*, and *Beilschmiedia bancroftii*) particularly susceptible to *Lyctus* damage. Results, after exposure for 3 years to *Lyctus* attack, are tabulated. DDT and 666 have given complete or almost complete protection, panels containing borax and boric acid show slight and those containing Na pentachlorophenate, pentachlorophenol, microfine S, and Na fluosilicate, severe damage. There is no method of discovering how long DDT and 666 will remain effective except by continuing the test. Recommendations for concentrations of 666 (preferable to DDT because of its lower cost and slightly better performance) are ¼ lb./1,000 sq. ft. of single glue line for periods up to and ¾–1 lb. for periods over 3 years. Neither DDT nor 666 appears to affect either working life or strength of the glue. Costs when using 666 are low, approx. 1·6*d*. per 100 sq. ft. of 3-ply for the lower and 6*d*. for the higher concentration.

1386. Blew, J. O., and Olson, W. Z. **The durability of Birch plywood treated with wood preservative and fire-retarding chemicals.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 16. 2 refs. P.R.

Exposure tests covering 5 different exposure conditions (soaking at room temperature in the treating solution used for the preservative treatment, continuous exposure at 97% relative humidity and 80° F., an alternating cycle of exposure for a month each to 30% and 97% relative humidity both at 80° F., continuous exposure at 30% relative humidity and 80° F., and soaking in a 4% solution of NaCl in water) were carried out over 6 years, on Yellow Birch plywood made with 8 different glues and treated with 7 standard preservatives and 3 fire retardants. Results are given in graphs and show that: (1) treatment of plywood with various chemicals did not reduce initial dry strength of the glue joint except, to a limited extent, in plywood made with room-temperature-setting urea resin and the casein glues; (2) the durability of plywood treated with coal-tar creosote and oils containing pentachlorophenol or Cu naphthenate was generally

improved, but not that of plywood made with a room-temperature-setting urea or a casein glue and exposed to high humidity; (3) the water-borne preservatives also to a lesser degree tended to increase the durability except when the plywood was made with a room-setting urea resin and soaked continuously in the preservative; and .(4) ammonium salts used in the fire-retardant treatments reduced the durability especially when the plywood was exposed to high humidity. Specimens made with phenol and resorcinol resin glues were least, and those made with room-setting urea resin most, affected. [Cf. *For. Abstr.* 10 (No. 496).]

1387. McKenzie, H. J. **Use of pressure treated ties, also creosoted timber for open deck packed chord trestles.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 3. [Texas and New Orleans Railroad Company, Houston, Texas.] P.R.

1388. Mann, R. H. **The fire resistance and slow burning characteristics of pressure creosoted piles and timbers in substructures of piers and wharves.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 8. 5 refs. [Service Bureau, American Wood-Preservers' Association, New York.] P.R.

Fires in piers and other waterfront structures during the last 20 years in the port of New York and along the New England coast are discussed, and the following conclusions are drawn: (1) Pressure-creosoted piles in wharf substructures erected in tidewater are fireproof when the top elevation of the wood members is from $\frac{1}{3}$ to $\frac{2}{3}$ the normal tide range above low water. (2) Pressure-creosoted piles and timbers in pier or wharf substructures have definite slow-burning characteristics. (3) Creosoted piles of pier substructures even after long exposure to fire do not burn off and allow the superstructure to collapse. (4) Although freshly creosoted timber may be more inflammable than untreated material, creosoted timber that has been in place long enough for the more volatile fractions to escape, is less easy to ignite than untreated timber, and this resistance increases with age.

1389. Graham, R. D. **The soaking method for the preservative treatment of fence posts.** *Inform. Circ. Ore. For. Prod. Lab.* No. 4, 1950. pp. 24. 6 refs.

1390. **Wooden fence posts in Minnesota.** *Rep. Lake St. For. Exp. Sta. 1949*, 1950 (22–3).

Tamarack [*Larix laricina*] and Northern White Cedar [*Thuja occidentalis*] posts, 3–8 in. in diameter, were cold-soaked in a 5% solution of pentachlorophenol in small home-treating plants. Tamarack sapwood absorbed the chemical very well in about 48 hours. In White Cedar, penetration was only *ca.* $\frac{1}{8}$ in. in 3–4 days; penetration was somewhat deeper when posts were incised, but even then the sapwood was seldom completely treated. Driving wooden poles with the power furnished by a lift attachment on the farm tractor was rapid and satisfactory, and the driven posts needed no tamping.

1391. Blew, J. O. **Comparison of wood preservatives in Mississippi post study (1950 progress report).** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1757, 1950. pp. 11 + 2 tbls. 2 refs. P.R.

Results are given of tests conducted since 1936–38 on Southern Yellow Pine posts. Untreated posts had an average life of 3·3 years. This life was increased to periods ranging from 8 to over 15 years by the use of various preservatives applied by a variety of processes. *From author's summary.*

1392. Blew, J. O. **Comparison of wood preservatives in stake tests (1950 progress report).** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1761, 1950. pp. 7 + 19 tbls. 3 refs. P.R.

Results are given of tests carried out since 1938 on stakes of Southern Yellow Pine sapwood (treated by pressure and non-pressure processes), on treated and untreated plywood, modified woods and laminated paper plastic, and on untreated Southern Yellow Pine controls. Superficial treatments (dipping and brushing with preservatives) added from a few months to 4 years to the life of the untreated stakes, which varied from 1–6 years according to locality and climate. Water-borne preservatives provided less protection to the stakes than the standard preservative oils. *From author's summary.*

33.36.2. *Fireproofing*

See also *For. Abstr.* 12 (No. 1207, 1360, 1371, 1386, 1388).

1393. Essais sur la valeur ignifuge de certains produits de revêtement. [**Tests on**

the fireproofing effect of certain coatings.] *Rapp. Lab. Inst. nat. Bois* 1948–9 (52–4). [F.] P.R.

Tests were made on varnishes and a urea-formaldehyde paint applied to Beech and Balsa, and the results are shown in graphs. All the coatings gave additional fire resistance to Beech, the paint and a melamine-formaldehyde varnish giving the best results. Only the urea-formaldehyde paint increased the resistance of Balsa; specimens coated with the other products were more readily ignited than the untreated control.

1394. JONES, J. A., and NISWANDER, R. V. **Fire resistant finishes for aircraft.** *Aircr. Engng.* 22 (254), 1950 (109–12). P.R.

The effectiveness of a paint-type coating designed to 'puff' and form an insulating shield for protection of aircraft materials such as plywood flooring is reviewed. The development of an elevated-temperature testing apparatus for the evaluation of the fire resistance of trim materials is discussed. This apparatus permits the evaluation of the flammability of aircraft materials such as paper-surfaced plywood at temperatures ranging up to 860° F.

33.36.3. *Seasoning. Drying*

See also *For. Abstr.* 12 (Nos. 1269–70).

1395. MILLETT, R. S. **The air-seasoning of lumber.** *Mimeo. For. Prod. Lab., Can.* No. 0–143, 1949. pp. 5 + 2 dgms., 2 gphs., 1 tbl. P.R.

Discusses the purpose, principles and technique of air seasoning of lumber (yard location, piling methods, rates of seasoning, amount of degrade, storage of air-seasoned lumber) with particular reference to Canadian species and conditions.

1396. **Report of general committee on seasoning practice.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 4. P.R.

Contains an analysis of seasoning practices followed in air-drying poles of different coniferous species.

1397. Essais théoriques sur le séchage des bois. [**Experiments on wood seasoning.**] *Rapp. Lab. Inst. nat. Bois* 1948–9 (39–41). [F.] P.R.

Points from current experiments with Oak, Beech, Poplar and Pine, in relation to the fundamental behaviour of drying solids. For all species and thicknesses, seasoning first in the air and then artificially is advocated as the most economical.

1398. Essais de séchage à l'air et étude comparée de séchage des bois étuvés et non étuvés. [**Experiments on air seasoning and a comparative study on the seasoning of wood with and without previous kiln drying.**] *Rapp. Lab. Inst. nat. Bois* 1948–9 (41–3). [F.] P.R.

Wood which had been kiln-dried to a humidity of 55–60% and fresh wood with a humidity of 70–75% both reached an air-dry humidity after air seasoning for 6 months. The kiln-dried wood seasoned more rapidly in the early stages of air drying, but the rate of drying decreased steadily throughout the period. The experiments showed that 27-mm. Oak reached a humidity of 15–20% in 3–4 months during late spring, and in 5–6 months during winter, or a general average of 4 months: Beech of the same thickness reached a humidity of below 20% in an average period of 3 months, varying with the season.

1399. CLAUSEN, V. H., REES, L. W., and KAUFERT, F. H. **Development of collapse in Aspen lumber.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (460–8). 7 refs. [Division of Forestry, University of Minnesota.] P.R.

Collapse was found to be a common and serious defect of kiln-dried Aspen, particularly when severe kiln schedules were used, but infrequent in air-seasoned timber. In most cases collapse developed in boards cut from or including the 'wetwood' zone of Aspen logs. 'Wetwood' is easily identified by its darker colour and wet appearance, and photographs showing it are included. It normally occurs as a zone between heartwood and sapwood and appears to be present in only a small percentage of logs. Examination of 'wetwood' showed that it is characterized by high moisture content, extreme imperviousness to the passage of air and liquids, uniformity of infection with what appears to be a single species of bacterium (not yet identified), weakness in compression and deficiency in toughness as compared with the sapwood. Separation of boards containing 'wetwood' from sapwood boards, and air seasoning this material before kiln drying, is an effective method of reducing losses from collapse.

1400. RIETZ, R. C. **Accelerating the kiln drying of hardwoods.** *Sth. Lumberm.* 181 (2262), 1950 (43–4, 46, 48, 52, 54).

Practical recommendations.

1401. **The seasoning properties of exotic timbers.** *Leafl. For. Prod. Res., Lond.* No. 44 (*Suppl.* No. 1), 1950. pp. 2.

Data are given for *Gossweilerodendron balsamiferum*, *Antiaris africana*, *Turraeanthus africanus* and *Brachystegia* [?] *boehmii*, under appropriate kiln schedules.

1402. Étude sur le séchage des branches du buis. [**Research on drying Box branches.**] *Rapp. Lab. Inst. nat. Bois* 1948–9 (43–4). [F.] P.R.

Experiments on drying small lengths of Box branches (6–8 cm. long and 1–2 cm. in diam.) gave the following results: (1) the rate of drying was similar for barked and unbarked wood; (2) no drying defects were caused by temperatures up to 40° [C.]; (3) the drying time is a function of the temperature. At temperatures of 8–10°, a humidity of 10% was reached from the green state in a month, and at temperatures of 35–40° in 4–5 days. The progress of seasoning at different temperatures is shown in a graph.

1403. LEHRBAS, M. M. **Direct gas-fired kilns in the South.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (436–42). P.R.

Types of kiln are described. Current operating costs based on a survey of 50 operations are presented. Temperature control is discussed, and moisture contents of stock before and after seasoning in different types of kiln are tabulated.

1404. GRAHAM, P. H. **Dry kilns take gas for economical operation.** *Wood-Worker, Indianap.* 69 (2), 1950 (26–8). P.R.

Natural- and forced-draught kilns for burning natural gas (generally of low pressure) are described, and the estimated costs of drying timber by this method are given. Developments in improving humidity control, the chief weakness of gas-fired kilns, are in progress. Proper provisions, such as heavy insulation, must be made against fire. The kilns are inexpensive to instal and operate, and are reported to dry most species satisfactorily, quickly and cheaply.

1405. LÖFGREN, B. E. Några synpunkter på virkestorkningsproblemet: längd- eller tvärcirkulation? [**Aspects of the seasoning problem: longitudinal or transverse circulation.**] *Pap. ja Puu* 32*B* (4*a*), 1950 (51–6). [Sw.e.] P.R.

Discusses the advantages of longitudinal and transverse circulation in kilns, concluding that choice between them must depend on local conditions and on space available, but that where there is no shortage of space, longitudinal circulation is likely to be cheaper.

1406. **Using the wet- and dry-bulb thermometers in lumber dry kiln work.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1772, 1950. pp. 3 + 2 photos, 1 tbl.

1407. LEISCHNER, G. **Method and device for drying timber, boards.** *Brit. Patent* No. 604,996, July 14, 1948. *Abstr.* in *Timber News* 58 (2132), 1950 (262–3).

Describes a method of drying timber, wood boards and wood blocks by arranging heating and cooling elements alternately on each side of the material to be dried. The elements are placed so that a heating element on one side is opposite a cooling element on the other. The cooling elements are at a distance from the wood so that condensation water may flow out between the wood and the cooling surface. The heating elements are in contact with the boards in order to obtain good transmission of heat.

1408. KOLLMANN, F. Untersuchungen über die Ursachen von Schäden bei der Trocknung von grünem Eichenholz zugleich Mitteilung über Festigkeitsprüfungen an Holz im hochfrequenten Wechselfeld. [**Research on the causes of damage during the drying of green Oak and report on strength tests on wood in a high-frequency alternating field.**] *Medd. svenska TräforsknInst.* (*Trätekn. Avd.*). No. 21, 1950. pp. 32. 27 refs. [G.g.] P.R.

Experiments are described on (1) the relationship between the transverse tensile strength of unseasoned Oak and the temperature (−70 to 100° C.), (2) the relationship between the shear strength parallel to the grain of unseasoned Oak and the temperature, and (3) the effect of temperature on the speed of seasoning, shrinkage during seasoning, and

checking. Results are given in graphs and tables.

1409. HUDSON, M. S. **Drying lumber by the vapor process.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 29. 10 refs. P.R.

Use of the vapour-drying process for preparing green timber for treatment with preservative salts, and for re-drying the treated timber is described. Pre-drying, treatment with Celcure, and re-drying, can be carried out in *ca.* 30 hours with perchlorethylene, in 20 hr. with xylol (*S*–280) and in 16 hr. with high-flash coal-tar naphtha (*K*–4). [Cf. *For. Abstr.* 11 (No. 525).]

33.37-8. Destructive Distillation. Charcoal and By-products. Use of Wood and Charcoal for Gas Manufacture

1410. ALINARI, E. Carbonizzazione e distillazione secca del legno. **[Carbonization and dry distillation of wood.]** *Ital. for. mont.* 5 (4), 1950 (136–41). [It.f.e.]

A short account of current methods. The quantities of charcoal, tar, and by-products produced per stere of Beech (*ca.* 380 kg.) and of coniferous wood (*ca.* 280 kg.) are tabulated.

1411. SUSMEL, L. Caratteri e riconoscimento dei principali carboni di legna. **[Character and identification of the principal [Italian] species of wood charcoal.]** *Ital. for. mont.* 5 (4), 1950 (149–55 + 46 photos). [It.]

Mean specific gravity of seasoned wood and of charcoal, and mean reduction (transverse, longitudinal, in volume and in sp.gr.) through carbonization, are given for Spruce, Fir, Maritime Pine, Oaks, Chestnut, Ash, Beech, Hornbeam, Arbutus, Heaths and *Eucalyptus*. Magnified photographs are provided of charcoals of the above species and also of Larch, Scots Pine, *Pinus pinea*, Walnut, Maple, Lime, White Poplar and Black Poplar. Characters for identification (pith, sapwood, growth rings, early and late wood, resin canals, medullary rays, bark, radial section) are tabulated.

1412. NOAKES, D. S. P. **The Mangrove charcoal industry in Matang.** *Malay. Forester* 13 (2), 1950 (80–3 + 2 photos). 3 refs.

A short account of the charcoal industry which was started at Matang in Malaya with the introduction of the 'Siamese' brick kiln about 1930 [cf. *For. Abstr.* 2 (p. 315)]. Among the modifications which have been made in the process, the most important is the practice of standing each log on a piece of brick to ensure complete carbonization. As a result, half-burnt charcoal, which formed a third of the total production from the old clay kilns, is almost unknown. There is a trend in favour of removal of bark and the use of small rather than large wood. A comparison is made between pre-war and post-war costs.

1413. OLSON, A. R., and HICOCK, H. W. **A charcoal kiln made of cinder-concrete blocks.** *Bull. Conn. agric. Exp. Sta.* No. 494, 1946. pp. 30.

Cf. *For. Abstr.* 8 (No. 1990).

1414. **Fuel briquettes (Annotated bibliography of published information).** Fuel Research Station, Department of Scientific and Industrial Research, London. 1949. pp. 63. P.R.

Includes sections on briquettes from charcoal, and wood waste. Covers European and American publications within the last 40 years.

1415. ERVIN, H. O. **Wood waste carbonization: a report on sawdust utilization.** *Reprs.* from *Wood, Chicago* Feb., Apr., 1947. pp. 2 + 2. P.R.

Describe the manufacture of charcoal briquettes from sawdust.

1416. BEUSCHLEIN, W. L. **The production of wood coke from waste wood.** *Bulletin, University of Washington Engineering Experiment Station, Seattle* No. 117, 1950. pp. 39. 11 refs. P.R.

Douglas Fir hogged chips were carbonized in an experimental rotary retort, and the liquid products of the process collected and determined. Charcoal briquettes were made by mixing the wood-tar binder with the pulverized charcoal, compressing the mixture, and coking at about 650° F. for 30 minutes. A moulding pressure of 5,000 lb./sq. in. and a binder containing 28·5% wood tar by weight, gave the best briquettes, with a density of 0·62 and a crushing strength of 330 lb./sq. in. The briquettes were analysed, and the results are tabulated. A pilot-plant retort produced charcoal at the rate of 24 lb./hr., giving yields, expressed as percentages of dry wood fed to the retort, of charcoal 38%, condensate 42%

and gases 20%. When the charcoal/tar mixture was briquetted in a commercial rotary briquetting press, yields of briquettes were below expectation, because the equipment was not suitable for handling the mixture. Analyses of the briquettes are tabulated.

33.39. Manufacture of Sugar, Oils, Alcohol, and Miscellaneous Chemical Products from Wood

1417. VERONA, O. Il legno nelle industrie fermentativo. [**Wood saccharification.**] *Ital. for. mont.* 5 (4), 1950 (142–6). [It.f.e.]

Describes the Scholler, Bergius, and Giordani-Leone processes in some detail. The following data for 13 processes are tabulated for comparison:—Kind and concentration of acid used, temperature, and yield of alcohol in l./100 kg. wood.

1418. SCHOLLER, H. Über den heutigen Stand der Holzverzuckerungs-Industrie. [**Present position of the wood saccharification industry.**] *Angew. Chem.* 61 (11), 1949 (452). [G.] D.S.I.R.

Abstract of a paper presented at a meeting of the Gesellschaft Deutscher Chemiker, Munich, Sept., 1949.

1419. JONES, I. R. **Wood sugar molasses for dairy cattle.** *Sta. Circ. Ore. agric. Exp. Sta.* No. 181, 1949. pp. 12. 5 refs. P.R.

Wood sugar molasses was found to be palatable to dairy heifers. There was no appreciable difference in feeding value, as measured by milk productions and weight changes, in alfalfa silage made with wood- or cane-sugar molasses.

1420. **Wood molasses.** *Rep. Sth. For. Exp. Sta. 1949*, 1950 (53–4).

Test feeding of a small number of calves showed that up to 25% of the corn ration can be replaced by wood molasses without any ill effect. More extensive tests are planned. [Cf. *For. Abstr.* 11 (Nos. 535, 2126).]

33.4. *Converted Structural Timber*

See also *For. Abstr.* 12 (Nos. 1362, 1441, 1528 *et seq.*).

1421. ARMSTRONG, F. H. **Timber as a flooring material—its relative resistance to wear.** *Chem. & Ind.* No. 9, 1950 (167–8). [Forest Products Research Laboratory, Princes Risborough.] P.R.

Abstract of a paper read at the January meeting of the Road and Buildings Materials Group of the Society of Chemical Industry.

1422. Essais sur portes planes. [**Tests on flush doors.**] *Rapp. Lab. Inst. nat. Bois* 1948–9 (35–7). [F.]

Describes tests on the strength and resistance to moisture and to soaking of commercial flush doors. [Cf. *For. Abstr.* 11 (Nos. 537, 1355).]

1423. **Timber Dutch lights.** *Brit. Stand.* No. 1612, 1950. pp. 13. Price 2*s.* P.R.

33.5. *Pitprops. Sleepers. Poles and Other Roughly Converted Wood*

See also *For. Abstr.* 12 (Nos. 1173, 1197, 1361–3, 1387–92, 1396).

1424. NÁJERA Y ANGULO, F. Abastecimiento nacional de traviesas. Estudio de las maderas tropicales españolas aptas para esta aplicación. [**National supply of railway sleepers. Study of tropical woods from Spanish Guinea suitable for this purpose.**] [*Bol.*] *Inst. for. Invest. Exp. Madrid* 21 (50), 1950. pp. 128 + 20 plates. 67 refs. [Span. f.e.g.]

A comprehensive study in 5 parts. Part 1 reviews the consumption and supply of sleepers in Spain. Part 2 discusses the tropical forests of Spanish Guinea as a source of supply, possible forms of exploitation, and the suitability of tropical timbers for sleepers. Part 3 consists of a study of the properties of 15 timbers from Spanish Guinea and deals with the problems of preventing splitting in sleepers (describing Delor's method of binding them with metal straps) and of preventing the loosening of screws, and describes air-seasoning methods. In Part 4 are presented tables for calculating the number of sleepers obtainable from logs 2·6 m. long and 0·26–1·5 m. in diameter. Part 5 details physical and mechanical methods of identifying the 15 woods studied.

1425. OGDEN, W. H. **Crosstie industry facts for the Tennessee Valley authorities.** Division of Forestry Relations, Tenessee Valley Authority. 1949. pp. 21.

33.6. *Packing Boxes, Crates, etc.*

See also *For. Abstr.* 12 (No. 1201).

1426. **Modern packaging encyclopedia.** Packaging Catalog Corporation, New York. 1949. pp. 994. P.R.

Includes sections on cases, boxes, drums, barrels, etc. of wood, plywood, and fibreboards.

1427. REHMAN, M. A., and CHATTERJEE, N. C. **Notes on Indian woods for packing cases (with a note on insect damage).** *Indian For. Leafl.* No. 106, 1949. pp. 20. Price *As.*6 (7*d.*).

Includes lists of species (separately for each of the 5 regions of India) whose wood is known to be suitable for use in packing cases, and of species yet to be tried. Their liability to insect damage is described. The necessity for proper seasoning is stressed. *From authors' summary.*

1428. [GOOLD, H. E. W.] **Packing in wood.** *Packaging, London* 31 (234), 1949 (36–9). P.A.T.R.A.

Discusses the design of nailed joints, the use of nails [cf. *For. Abstr.* 12 (Nos. 1245, 1536)] coated with cement or resin to improve the grip, the quality requirements for case timbers, the packing of large and awkward items, and the use of case liners to protect the contents against moisture.

1429. STERN, E. G. **Conduct comparature test on old, new grooved nails.** *Wooden Box & Crate, Washington* 11 (5), 1949 (21–5). P.A.T.R.A.

Discusses small changes in the design of nails to increase their efficiency in withdrawal resistance and lateral load-carrying capacity. [Cf. preceding abstract.]

33.7. *Firewood*

See also *For. Abstr.* 12 (Nos. 1239, 1246–8, 1316).

1430. BROWN, D. L. **Handy charts simplify wood-fuel combustion checks.** *Ext.* from *Power, New York* Nov., 1949 (112–4). D.S.I.R.

Nine graphs relating to: moisture content, volume weight; flue-gas analysis; combustion characteristics; and heat losses from moisture, from water of combustion, from incomplete combustion, and due to sensible heat.

1431. PERBOHNER, S. **A process for improving the combustibility and water-resistance of wood.** *Brit. Patent* No. 636,004, Mar. 17, 1949. pp. 5. P.R.

Wood, including briquetted wood waste, is impregnated with an aqueous solution of one or more oxidizing agents (e.g. inorganic nitrates, chlorates or perchlorates) without the evolution of free O, and then coated with a water-resisting composition (e.g. paint, enamel, lacquer, varnish or distemper).

33.8. *Other Manufactured Products*

See also *For. Abstr.* 12 (No. 1394).

1432. FERNANDEZ-PRIDA, C., and MENDOZA, G. Utilización de la madera como material de construcción en la industria aeronáutica. **[The use of wood as constructional material in the aircraft industry.]** *Montes, Madrid* 6 (31), 1950 (39–51). [Span.]

Some general principles, including strength properties of certain native and introduced species

1433. WOODS, R. P. **Comparative decking experiments.** *Quart. Rev. Timb. Developm. Ass.* 2 (10), 1950 (13–5).

Describes the first controlled experiments with ships' decking, laid on the 'Nottingham', a New Zealand Shipping Company's vessel. Apart from Teak, the timbers under test were Afrormosia, Agba, White Peroba, Iroko, Mahogany and White Seraya.

1434. GESTAS, P.-L. Le bois de charme dans la fabrication des formes à chaussures. **[Hornbeam wood in the manufacture of shoemakers' lasts.]** *Rev. Bois Appl.* 5 (7/8), 1950 (12). [F.] P.R.

1435. **Hand hammers.** *Brit. Stand.* No. 876, 1949. pp. 31. Price 3*s.* 6*d.* P.R.

1436. GREAVES, C., and HARKOM, J. F. **Treatment of pencil slats. Parts 1 and 2.** *Mimeo. For. Prod. Lab., Can.* No. 0–122 (rev.) 1949. pp. 45 + 24 + 6 tbls. P.R.

Revision of a 1931 report to include further experimental results and manufacturers' opinions on the slats (Western Red Cedar, Eastern Cedar and Yellow Cypress) so treated. The preparation, staining, waxing and testing procedures are detailed. Western Red Cedar responded best.

1437. **A comparison of woods for cutlery handles.** *Report, Engineering Division, Jeffersonville Quartermaster Depot, Jeffersonville, Indiana* 1945. pp. 4. P.R.

1438. [WIERZBICKI, J.] **The use of timber for agricultural drains.**] *Timber News* 58 (2134), 1950 (328–9).

[Extract from an English translation of an article in Polish.]

A review of various types of closed timber drains used in peaty soils, and developed in England (Stephens), Denmark (Jensen), Switzerland (Butz), and Poland. Describes their manufacture and laying and tests carried out in Poland in 1925–38. Timber drains should be used instead of earthenware drains in peat soils, which are prone to unequal settlement and hence stoppage of the water flow.

33.9. *Grading [including Standard Specifications] and Storage of Converted Timber*

See also *For. Abstr.* 12 (Nos. 1311, 1423, 1435).

1439. JOHNSON, R. P. A. **Grading problems that challenge the lumber industry.** *Prepr. U.S. For. Prod. Res. Soc.* No. 133, 1950. pp. 4. P.R.

Discusses the multiplicity of grades, the use of non-destructive tests to improve selection, and the effect of region of growth on strength.

1440. PADDON, T. W. **Behind stress grading.** *Timber News* 57 (2124; 2125), 1949 (405–7; 446–8).

[Cf. *For. Abstr.* 11 (No. 1370).] Discusses the effect of defects, density, and the proportion of early and late wood, on load-bearing capacity, and describes methods of obtaining the data upon which stress grading is based.

1441. **Structural timber: grading rules.** *Transl. For. Prod. Aust.* [1950?]. pp. 9. Transl. by K. L. Cooper and S. Walker from [*Dtsch. Norm.*] DIN 4074, March 1939.

1442. **Indian [Republic] standard specification for coniferous sawn timber intended for further conversion.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50/*FE*/10, 1950. pp. 7. P.R.

A tentative standard specification prepared by the Timber Products Sectional Committee of the Indian Standards Institution. A note on the occurrence of coniferous timbers, the manner of their extraction, their broad characteristics and use, is given in an appendix.

1443. **Timber grading in Burma.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50/*FE*/12, 1950. pp. 2. P.R.

Notes on log and lumber grading for export.

1444. **Timber grading in Thailand.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50/*FE*/16, 1950. pp. 7. P.R.

Manufacturers' lumber grading rules, chiefly for Teak.

1445. **Indochina. Project pertaining to the classification of commercial timbers in accordance with their properties.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50/*FE*/13, 1950. pp. 8. P.R.

Suggested grades for timbers used in heavy and light construction, and for veneer and plywood. [Cf. *For. Abstr.* 12 (No. 1275).]

1446. **Indochina. Standard dimensions for sawn timber.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50/*FE*/17, 1950. pp. 2. P.R.

1447. **Grading of Indonesian Teak.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F*50/*FE*/14, 1950. pp. 6. P.R.

Rules for export squares (baulks), export flitches, and sleepers.

1448. **List of Indonesian commercial timber dimensions.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing*

Methods, Grading and Dimensions of Timber Vietnam No. *F50/FE/18*, 1950. pp. 1. P.R.

1449. **Grading rules governing the inspection and measurement of Philippine lumber.** [*Proceedings of the F.A.O.*] *Technical Meeting on Standardization of Nomenclature, Terminology, Testing Methods, Grading and Dimensions of Timber, Dalat, Vietnam* No. *F50/FE/15*, 1950. pp. 4. P.R.

1450. **North Borneo standard grading rules.** *N. Borneo For. Rec.* No. 1 (4th ed.), 1950. pp. 33.

Contains: standard grading rules for round and squared logs and converted or sawn timber; appendices, including data on standard defects, definitions, a table of recommended sawing sizes, and trade names and weights of timbers; and instructions for the measurement of logs.

1451. GIORDANO, G. I depositi di segati. **[The storage of sawn timber.]** *Monti e Boschi* No. 1, 1950 (27–31). [It.]

A short, illustrated account of methods of stacking sawn timber.

1452. HEIKINHEIMO, O. Repola-Viipuri Oy : n Hillon lautatarhan rakennusvaiheita ja toimintaa. **[The new lumber yard of Repola-Viipuri Oy. at Hillo, Haminaa.]** *Papp. Trävarutidskr. Finl.* 31 (21), 1949 (393–401). [Fi.e.] P.R.

Describes the lay-out and equipment, on American principles of mechanical handling, of a lumber yard near the port of Hillo. In its first season, *ca.* 28,000 standards have been handled at a great saving in wages.

34. MINOR FOREST PRODUCTS AND THEIR UTILIZATION

34.2. *Vegetable Products*

See also *For. Abstr.* 12
(Nos. 901, 943–6, 990, 1060, 1143).

34.23. Wood Ash. Potash

1453. LUNT, H. A. **Wood ashes as a fertilizer.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 32, 1950 (11–4). P.R.

Discusses the value and use of wood ashes as K, N, and P fertilizer. [Cf. *For. Abstr.* 11 (No. 1374).]

34.24. Bark Products. Tanning Materials. Cork.

See also *For. Abstr.* 12
(Nos. 1143, 1343, 1486, 1508).

1454. ÖGLAND, N. J. Bark, råvara eller avfall? **[Bark—raw material or waste]** *Svensk PappTidn.* 53 (6), 1950 (164–6). 21 refs. [Sw.e.g.] [Mo och Domsjö Treetex AB, Örnsköldsvik.] P.R.

A review of literature.

1455. FULLER, R. G., HARSTON, C. B., and CHESTER, K. S. **The utilization of waste bark.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 32, 1950 (27–32). P.R.

Ground waste bark was shown to be a better poultry-house litter material than peat moss, diatomite, sugar-cane waste and ground or chopped corn cobs, in respect of moisture absorptivity, drying properties, friability, N retention and insulation value. It also compares favourably with straw as a mulch. Field plantings of bark-mulched tomatoes yielded more fruit, and straw-mulched tomatoes yielded less fruit than the unmulched controls. The bark prevents drying out and crusting better than peat moss or vermiculite, irrespective of the nature of soil. As media for rooting cuttings of various plants, bark and sawdust proved less satisfactory than peat moss, sand or vermiculite.

1456. LEWIS, H. F. **Utilization of Redwood bark.** *Paper Tr. J.* 130 (14), 1950 (18–20, 22). 9 refs. [Institute of Paper Chemistry, Appleton, Wis.] P.R.

The paper, presented at the 1949 Annual Meeting of the Forest Products Research Society, summarizes work at the Institute of Paper Chemistry and the Pacific Lumber Company. The mechanical separation of the bark into 'fibre' and 'dust' is described, and chemical and physical properties of the fractions are discussed. Experiments on the use of the fibre in low-quality papers, as a filler for plastics, as insulating material, and in textile manufacture, are described. Attempts to bleach the fibre reduced its physical properties. It is resistant to acid. An analysis of the composition of the bark dust in comparison with peat moss is given, and its use as a mulch is discussed. The production of Na palconate from the acid fraction of the bark and its

potential use as an oil-well drilling-mud additive, or in the flotation of CaF_2 from $CaCO_3$ and SiO_2 are described.

1457. KURTH, E. F. **The composition of the wax in Douglas-Fir bark.** *J. Amer. chem. Soc.* 72 (4), 1950 (1685–6). 6 refs. [Oregon Forest Products Laboratory and Oregon State College.] O.R.S.

Based on the saponification products, the wax contains *ca.* 20% lignoceryl alcohol, 60% lignoceric acid, and 20% ferulic acid (4-hydroxy-3-methoxycinnamic acid). Phytosterol is a minor constituent and oleic acid may be present. The acid constituents are present in both the free and combined states. *From author's summary.*

1458. KURTH, E. F., HUBBARD, J. K., and HUMPHREY, J. D. **Chemical composition of Ponderosa and Sugar Pine barks.** *Repr. U.S. For. Prod. Res. Soc.* No. 39, 1949. pp. 7. 9 refs. P.R.

Bark of *Pinus ponderosa* was found to contain 23·2 to 28·7% extractives, the highest yield being from bark at the foot of the oldest trees. Tannin content was between 5·6 and 11·4% and there are possibilities of economic commercial extraction and utilization. Other extractives include a lignocerate wax, a phenolic fatty acid complex, and a flavonol yellow colouring matter. At least two types of material in the bark appeared as 'lignin', both significantly different from wood lignin, but chemically similar to the 'lignin' components found in Redwood bark. The Sugar Pine (*P. lambertiana*) bark contained about 21–22% extractives, between 4·9 and 7·1% tannin, and 2·2–3·1% wax. The major extractive was a reddish-brown phlobaphene; the minor extractives were lignoceric acid and an alcohol. *From authors' summary.*

1459. KURTH, E. F., HUBBARD, L. K., and HUMPHREY, J. D. **Tannin from Pine bark. [*Pinus lambertiana* and *P. ponderosa*.]** *Leather & Shoes, Chicago* 119 (5), 1950 (24, 27). [Oregon Forest Products Laboratory.] L.S.

Cf. preceding abstracts.

1460. GROCHOWSKI, W. Jak pozyskiwać korę świerkową surowiec garbnikowy. **[How to harvest Spruce bark for tanning.]** *Ulotk. Wydaw. pop.* (*Ser. C*) *Inst. Bad. Leśn.* No. 27, 1949. pp. 32. [Pol.]

Practical hints on the harvesting and storage of Spruce bark during the spring-summer and winter seasons.

1461. KURTH, E. F., HUBBARD, J. K., and GEKELER, M. **Extraction of tannin from Douglas-Fir bark and concentration of the tan liquor.** *Repr.* from *Leather and Shoes, Chicago* No. 5, Nov. 19, 1949. pp. 6. 5 refs. P.R.

Cf. *For. Abstr.* 11 (No. 3155).

1462. MACLEAN, H., and GARDNER, J. A. F. **Tannin for the leather industry from sea-water floated Western Hemlock bark.** *Mimeo. For. Prod. Lab., Can.* No. *V*–1009, 1950. pp. 21. 17 refs. P.R.

(1) Hydraulic barking was found to have advantages when bark was to be used for tannin extraction, because bark with a low wood content was obtained, tannin loss was low, and a considerable amount of salt was washed out of sea-water-floated logs. (2) Tannin content of bark was found to be roughly proportional to the time spent in the water, and use of log-boom data at the barking plant should allow selection of bark containing sufficient tannin for extraction. (3) The rate of loss of tannin from bark on logs in fresh and salt water was found to be much the same, in the range of 5–10% per month for the first few months. In salt water, most of the salt is deposited in the first month. (4) A method of removing salt, based on ion-exchange treatment, was used, and good sole leather was prepared in the laboratory from tannin thus treated. Pilot-plant investigations are recommended. *From authors' summary.*

1463. MACLEAN, H., and GARDNER, J. A. F. **Tannin for the oil industry from sea-water floated Western Hemlock bark.** *Mimeo. For. Prod. Lab., Can.* No. *V*–1010, 1950. pp. 5. 5 refs. P.R.

A sample of concentrated tannin extract was prepared in the laboratory from sea-water-floated, hydraulically barked Western Hemlock bark by leaching it, finely ground, with hot water, partially concentrating the dilute extract, sulphiting with sodium metabisulphite and then concentrating to 50% solids under reduced pressure. On the basis of laboratory tests made by an oil-drilling company, this material has been found to be just as effective

as a viscosity-reducing agent for drilling mud, as commercial Quebracho.

1464. **Some potential sources of important plant products in California.** *Econ. Bot.* 4 (1), 1950 (3–36). 11 refs.

A review based on abstracts of articles by 12 different authors. A survey of tannin consumption, production and imports in the U.S.A. leads to the conclusion that the current shortage is acute and could be critical if Chestnut were lost without replacement, through disease. It is suggested that the California Tanbark Oak (*Lithocarpus densiflora*) could be profitably used in both the tannin and pulping industries and that Wattle (*Acacia* spp.) should be grown and exploited on a commercial scale. Data on the commercial possibilities of these species are presented, and the potentialities of *Conocarpus erectus, Reynosia septentrionalis, Rhus copallina, Tsuga canadensis, T. heterophylla*, and other sources, are briefly considered; also the prospects of growing *Doryphora sassafras* for production of safrole and of exploiting *Umbellularia californica* for thymol.

1465. ROGERS, J. S. **Tannin from Northeastern barks.** *Paper Tr. J.* 128 (16), 1949 (21–3). 20 refs. P.R.

A few samples of bark were examined and the tannin content, on a moisture-free basis, was determined. Of these, Red Spruce (*Picea rubens*) 13%, and Eastern Hemlock (*Tsuga canadensis*) 12%, were the most promising. One sample of Maple contained 9·4% tannin. The other samples (*Abies balsamea, Populus tremuloides, Fagus grandifolia, Betula* spp., Cherry and *Pinus strobus*) had tannin contents ranging up to 6%. Tannin content, to justify processing, should be 7% or over. Estimated figures of potential tannin supplies, showing tons of bark, tannin %, and tons of 100% tannin, based on pulpwood receipts at Northeastern mills, are given. The data of tannin content and bark available are inadequate for estimating the prospects of commercial recovery of tannin from Northeastern waste bark, and further research is recommended.

1466. **Wattle bark cultivation in South Africa.** *Timber News* 58 (2133), 1950 (283–4, 287). P.R.

1467. STEPHEN, A. M. **The chemical constitution of wattle (Mimosa) [*Acacia decurrens* var. *mollissima*] tannin.** *Journal of the Chemical Society, London.* Dec., 1949 (3082–5). [Leather Industries Research Institute, Grahamstown, South Africa.] O.R.S.

1468. CHAMBARD, P., and ABADIE, F. Le tanin de l'écorce d'*Eucalyptus sideroxylon* et ses propriétés. **[Tannin from the bark of *E. sideroxylon* and its properties.]** *Bulletin de l'Association française des Chimistes des Industries du Cuir, Paris* 11 (11/12), 1949 (187–202). 9 refs. [F.] L.S.

Discusses and gives tables showing the composition of the bark extract of *E. sideroxylon* and other *Eucalyptus* species, and the tanning properties of *E. sideroxylon*, Quebracho and Chestnut tannins.

1469. SNOW, E. A., and BAILEY, L. F. **Tannin from Oak slabs.** *Journal, American Leather Chemists' Association, Easton, Pa.* 44 (10), 1949 (737–44). 12 refs. L.S.

Results are given of research on the effects of weathering and of extraction temperatures on the yield of tannin from mixed-Oak sawmill waste (slabs). The exposure of Oak slabs to weathering up to 1 year did not result in leaching losses of tannin. The tests suggest that commercial extraction of mixed-Oak slabs would be most economical at a temperature of *ca.* 80°C. *From authors' summary.*

1470. CLARKE, I. D., ROGERS, J. S., SIEVERS, A. F., and HOPP, H. **Tannin content and other characteristics of native Sumac in relation to its value as a commercial source of tannin.** *Tech. Bull. U.S. Dep. Agric.* No. 986, 1949. pp. 76. 25 refs.

Eight species of Sumac growing wild in the eastern and southern United States were studied. A brief description of each species is given, with its distribution and the range within which commercial collection might be profitable. A survey of wild Sumac in an area of about 12,000 sq. miles in Virginia indicates that *ca.* 43,000 long tons of dry leaf would be available there annually. About 684 samples of leaves and 311 samples of other parts of the plant were analysed; leaves, leaflets, and flowers, had a high, and petioles, rachises, stems, bark, wood, and seed, a low tannin content. Leaves of ♂ plants of *Rhus copallina* averaged 3·3% more tannin than those of ♀ plants; no significant difference was found

between ♂ and ♀ plants of *R. glabra*. Leaves of *R. copallina* and *R. glabra* growing in partial shade averaged 2·8% less tannin and 1·3% more non-tannin than those in full sun. The tannin contents of leaves of *R. copallina* and *R. glabra* varied inversely with the height of the plant, showing a decrease of 0·61% for each foot of increase in height. There was an average decrease of 0·047% per day between mid-June and mid-September. The condition of the cured leaves of *R. copallina* and *R. typhina* did not affect their tannin content. The average tannin content of *R. copallina* varied significantly in 3 districts; that of *R. glabra* and *R. typhina* showed no geographic variation. The average tannin content of moisture-free leaves varied from 39·14% for *R. trilobata* to 19·32% for *R. microphylla*, and non-tannin content from 24·5% in *R. microphylla* to 18·35% in *R. lanceolata*. Limited tests indicated that any of the species except *R. aromatica* and *R. virens* would produce leather of good colour. *R. copallina*, *R. glabra* and *R. typhina* are most promising commercially, and *R. trilobata* might be of value. *R. aromatica*, *R. lanceolata*, *R. microphylla* and *R. virens* are limited in distribution, not abundant, and have low tannin contents.

1471. Das, B. M. **Tanstuff resources of the Sunderbans forest division.** *Tanner, Bombay* 4 (7–9), 1949–50 (17–8; 15–7; 12–3). L.S.

Species suitable for the manufacture of tannin extract are: Sundri (*Heritiera minor*), Dhundul (*Carapa obovata*), Pussur (*C. moluccensis*), Gurjan (*Rhizophora mucronata*), Goran (*Ceriops roxburghiana*) (bark), and Kankra (*Bruguiera gymnorrhiza*) (bark). All these except Pussur are suitable for tanning directly. The following are suitable for direct tanning but not for the manufacture of extract: Goran leaves, Kankra leaves and fruit, Keora (*Sonneratia apetala*) fruit and mature bark, and Golpatta (*Nipa fruticans*) leaves. The tanning properties of each species are discussed. Only Goran bark has been commercially used. These tanstuffs are recommended for sole leather, as they give a reddish-coloured leather, and not the preferred light yellow.

1472. Narasimhachari, N., and Seshadri, T. R. **A note on the components of the bark of *Prunus puddum*.** *Proc. Indian Acad. Sci.* 30*A* (5), 1949 (271–6). 12 refs. O.R.S. [Cf. *For. Abstr.* 9 (No. 1805).]

1473. Briggs, L. H., and Locker, R. H. **Flavonols from the bark of *Melicope ternata*: Part I. The isolation of four new flavonols, meliternatin, meliternin, ternatin and wharangin. Part II. A synthesis of meliternin, *iso*kanugin and allied flavonols. Part III. A synthesis of quercetin 3:3′-dimethyl ether, quercetin 3:7:3′-trimethyl ether, quercetin 3:5:7:3′-tetramethyl ether, ternatin, and related benzyl ethers.** *Journal of the Chemical Society, London* Sept., 1949 (2157–64); March, 1950 (864–7). [Auckland University College, Auckland, New Zealand.] O.R.S.

1474. Kork als Rohstoff für Farben und Lacke. [**Cork as raw material for paints and lacquers.**] *Farbe und Lack, Hannover* 56 (1), 1950 (14–5). [G.] L.S.

Discusses the value of pure cork wax and suberolin for the paint and lacquer industry.

34.25. Medicinal and Edible Plants

See also *For. Abstr.* 12 (No. 1464).

1475. Deogun, P. N. **Camphor—its possible sources and production in India.** *Indian For.* 76 (4), 1950 (139–43 + 2 photos).

A short history of camphor, its demand and supply, its need by India and non-availability of any Indian raw material for its production, is given. Experimental cultivation of a quick growing and early camphor-yielding plant (*Ocimum kilimandscharicum*) at the Forest Research Institute, Dehra Dun, is described. Climatic and edaphic requirements of the new plant, methods of propagation, and extraction of camphor are briefly described. *From author's summary.*

1476. Plank, H. K. **Experiments with Mamey for pests of man and animals.** *Trop. Agriculture, Trin.* 27 (1/3), 1950 (38, 39–41 + 2 photos). 10 refs. [Federal Experiment Station, Mayaguez.]

Powdered mature seeds of *Mammea americana* or a water-infusion of half-ripe fruits (an infusion of 1 lb. fruit to make 1 gal.) was as effective, though not quite so permanent, as a 1% suspension of DDT in controlling fleas and ticks on dogs.

1477. VELDSMAN, D. P. **On venenatin, the cardiac glycoside from the bark and wood of *Acokanthera venenata* G. Don: I. Historical introduction, isolation, physical and chemical properties. II. Acetylation and hydrolysis of venenatin. III. Catalytic hydrogenation of triacetyl-venenatin and anhydro-venenatidin genin and derivatives.** *South African Industrial Chemist, Johannesburg* 3 (8; 9; 11), 1949 (144–7; 172–4; 217–9). 13 + 2 + 5 refs. L.S.

1478. CHEVALIER, A. La cortisone et sa production par les graines de *Strophanthus sarmentosus*. [**Cortisone and its production from seeds of *Strophanthus sarmentosus***.] *Rev. int. Bot. appl. Agric. trop.* 29 (325/6), 1949 (605–7). [F.] P.R.

The identity of the source of the first preparation of the sarmentogenin (Jacobs and Heidelberger, 1915, published 1929) is extremely doubtful, and that of the second batch likewise not very sure. An American scientific expedition to Liberia is being organized to discover the best plant source of sarmentogenin. Large plantations of *Strophanthus sarmentosus* are projected in Liberia. The preliminary results of research by Reichstein (Basle) indicate that the presence of sarmentogenin in seeds of *S. sarmentosus* depends on several factors, *inter alia* on the soil characteristics and direct insolation. [Cf. *For. Abstr.* 12 (No. 639).]

1479. ADAMS, R., and WHALEY, W. M. **The amaroids of Quassia [*Picraena* (*Aeschrion*) *excelsa*]. I. Quassin, isoquassin and neoquassin.** *J. Amer. chem. Soc.* 72 (1), 1950 (375–9). [Noyes Chemical Laboratory, University of Illinois.] O.R.S.

1480. CHATTERJEE, R., and GUHA, M. P. **The alkaloids of *Mahonia acanthifolia* Don.** *Sci. & Cult.* 15 (14), 1949 (163). 5 refs. [Presidency College, Calcutta.] L.S.

1481. CHATTERJEE, R., and GUHA, M. P. **Studies on *Mahonia* genus. Part I. The alkaloids of *M. griffithii* Takeda.** *J. Amer. pharm. Ass.* 39 (3), 1950 (171–2). 8 refs. [University College of Science and Technology, Calcutta.] O.R.S.

1482. KOEPFLI, J. B., MEAD, J. F., and BROCKMAN, J. A. (to the United States of America). **Obtaining febrifugine alkaloids [from ground roots of *Dichroa febrifuga*.]** *U.S. Patent* No. 2,504,847, Apr. 18, 1950. *Chem. Abstr.* 44 (13), 1950 (6086). P.R.

1483. LOUSTALOT, A. J., and PAGAN, C. **Local 'fever' plants tested for presence of alkaloids.** *El Crisol, San Juan, Puerto Rico* 3 (5), 1949 (3–5). [E.] *Chem. Abstr.* 44 (5), 1950 (2179–80). P.R.

Small amounts of alkaloid but no quinine or quinidine were found in a number of plants including *Exostema sanctae-luciae* (bark and leaves), *Waltheria americana*, *Poinciana pulcherrima* (leaves and stem), *Parthenium hysterophorum*, *Ipomoea quamoclit*, *Mimosa pudica*, and *Doxantha unguiscati*. Among febrifugal plants containing no alkaloids were: *Warszewiczia coccinea* (bark), *Sapindus saponaria* (leaves and stem), *Mammea americana* (bark), *Rhizophora mangle* (fruits), *Adansonia digitata* (bark) and *Urera baccifera* (leaves).

1484. KADAMBI, K., and RAGHAVAN, M. S. **Specific for black-water fever, *Vitex peduncularis*.** *Indian For.* 76 (5), 1950 (228).

Includes notes on its acclimatization in Madras.

1485. RAO, R. R., and NATARAJAN, S. **On 'morellin', the antibacterial principle of the seeds of *Garcinia morella* Desrous.** *Curr. Sci.* 19 (2), 1950 (59–60). 2 refs. [Indian Institute of Science, Bangalore.] A.P.B.

Laboratory tests proved the substance to have highly antibacterial and toxic properties.

1486. GROSJEAN, J. **Substances with fungicidal activity in the bark of deciduous trees.** *Nature, Lond.* 165 (4204), 1950 (853–4). 2 refs. [Instituut voor Plantenziektenkundig Onderzoek, Wageningen.]

An extract of the bark of *Populus candicans*, when concentrated by evaporation of water at boiling point, was lethal to *Stereum purpureum* growing on nutrient agar [cf. *For. Abstr.* 5 (60)]. Bark of *P. trichocarpa* gave extracts with an equally strong fungicidal activity. Bark of *P. monilifera*, *P. robusta*, *P. fremontii*, *P. wislizenii* and *P. eugenei* gave only very weakly fungicidal extracts. Active extracts were also obtained from *P. regenerata*, *P. serotina erecta* and *P. marilandica*. Leaves of *P. candicans* gave fungicidal extracts that were weaker than the bark extracts.

1487. KURUP, P. A., and RAO, P. L. N. **Antibiotic principles from *Moringa pterygosperma*.** *Curr. Sci.* 19 (2), 1950 (54). 1 ref. [Indian Institute of Science, Bangalore.] A.P.B.

Two antibiotic fractions were isolated from 'pterygospermin', an extract of the roots.

1488. KOROTKOV, I. L. **Accumulation of vitamin C in Pine needles on storage.** *Gigiena i Sanitariya, Moscow* 13 (10), 1948 (40–1). *Chem. Abstr.* 43 (14), 1949 (5453). P.R.

Needles of various conifers exhibit, on storage in the snow, a significant increase of vitamin C content during the winter, similar to that observed in the living plants. The needles may be collected in late autumn instead of in winter, and stored in the cold.

1489. KLOSE, A. A., STARK, J. B., PURVIS, G. G., PEAT, J., and FEVOLD, H. L. **Ascorbic acid from Walnut hulls.** *Industr. Engng. Chem.* 42 (2), 1950 (387–91). 10 refs. P.R.

In studies on the recovery of ascorbic acid from waste green Walnut hulls, an over-all yield of crystalline product of 25–50% was obtained. Pilot-plant extraction experiments were made. An analysis of estimated costs for a typical Walnut-growing district indicates that extraction might pay if an inexpensive method of storing green hulls and increasing yields could be found.

1490. ORŁOŚ, H. Grzyby jadalne i trujące. **[Edible and poisonous fungi.]** *Podręczn. (Ser. D) Inst. Bad. Leśn.* No. 3, 1949. pp. 223. 31 refs. [Pol.]

Practical textbook on the harvesting and processing of edible fungi; with 40 coloured plates.

1491. WAHL, Y. ***Boletus* mushrooms in Herzl Forest.** *Forest, Palestine* No. 2, 1950 (7–10, *Suppl.* 2). [Heb.e.]

Includes a description of the Herzl forest (*ca.* 500 dunams) near Ben Shemen, which was planted between 1921 and 1930, chiefly with *Pinus halepensis*. The edible fungus *Boletus granulatus* which is a natural associate of this Pine, appears abundantly throughout the rains and yields a high revenue. Notes on other mushroom species, *Coprinus*, *Inocybe*, *Marasmius* etc., are given in the order in which they appear in the forest.

34.26. Resin. Turpentine. Oils. Gums

See also *For. Abstr.* 12 (Nos. 950, 1027, 1143, 1284, 1457–8, 1464, 1474).

1492. SHINGLER, G. P. **Research findings and their use in the industry.** *Naval Stores Rev.* 60 (9), 1950 (14,18, 24–8). 16 refs.

A review of work on resin and resin-tapping in the U.S.A., with bibliography.

1493. COLLINS, D. N. **Applied research on Pine gum at the Naval Stores Station.** U.S. Bur. Agric. industr. Chem., Southern Regional Research Laboratory, New Orleans, La. No. *AIC*–251, 1949. pp. 5.

Reviews improvements in methods and technique brought about through the work of the Naval Stores Station, Olustee, Fla.

1494. RYBERG, M. E., and BURNEY, H. W. **Research in equipment for the production of gum naval stores.** *Tech. Pap. Engng. industr. Exp. Sta.* No. 32, 1949. pp. 20.

A joint research project started in 1946 by the South-eastern Forest and the University of Florida Engineering and Industrial Experiment Station has resulted in improved woods-operation equipment. New types of the following, many still in the development stage, are described, illustrated and discussed: acid spray guns; combined sprays and freshening hacks; hand- and power-operated hacks; helical gutters (lips) tacked on, instead of incised into, the face; and a combined lip and cup made of kraft paper.

1495. CLEMENTS, R. W., and COLLINS, D. N. **Larger turpentine cups prove more efficient without effect on product yields or grade.** *Naval Stores Rev.* 60 (13), 1950 (16–8).

In a study undertaken by the Southeastern Forest Experiment Station and the Naval Stores Research Division of the Bureau of Agricultural and Industrial Chemistry, U.S.D.A., it was found that no degradation of the resin, and no loss of turpentine resulted from the longer collecting interval when large cups were used. The number of collections per year could be reduced by 2 or 3, with a consequent saving in costs.

1496. HAAGEN-SMIT, A. J., WANG, T. H., and MIROV, N. T. **Composition of gum**

turpentines of *Pinus aristata, P. balfouriana, P. flexilis* and *P. parviflora*. *J. Amer. pharm. Ass.* 39 (5), 1950 (254–9). 16 refs. [U.S. Forest Service, Berkeley, Calif.] O.R.S.

1497. HAAGEN-SMIT, A. J., REDEMANN, C. T., WANG, T. H., and MIROV, N. T. **Composition of gum turpentines of Pines: a report on *Pinus ponderosa, P. banksiana, P. canariensis* and *P. washoensis*.** *J. Amer. pharm. Ass.* 39 (5), 1950 (260–5). 12 refs. [U.S. Forest Service, Berkeley, Calif.] O.R.S.

1498. MESSERI, A. Osservazioni anatomiche su pini sottoposti a resinazione. **[Anatomical observations on [Aleppo] Pine after resin-tapping.]** *Nuovo G. bot. ital.* (*n.s.*) 56 (3), 1949 (315–27 + 25 photos). [It.it.e.] A.P.B.

Cf. *For. Abstr.* 11 (No. 2175).

1499. OUDIN, A. Experiências sobre a resinagem do pinheiro bravo. **[Experiments in tapping *Pinus pinaster*.]** *Pinhal e Resina* 2 (8), 1949 (18–20). [Port.]

A summary of French work.

1500. LAAS, D. **Production of needle oils from German Coniferae.** *Seifen-Öle-Fette-Wachse* 75, 1949 (543–4). *Chem. Abstr.* 44 (6), 1950 (2706). P.R.

A review of the production and properties of the oils from needles and cones. [Cf. *For. Abstr.* 9 (No. 1210).]

1501. SHAW, A. C. **The essential oil of *Picea mariana* (Mill.) B.S.P.** *Canad. J. Res.* 28*B* (6), 1950 (268–76). 13 refs. P.R.

Major constituents of the essential oil were separated by fractional distillation. Evidence for the presence of 15 constituents was obtained, and 12 constituents were identified with certainty.

1502. DAVENPORT, J. B., JONES, T. G. H., and SUTHERLAND, M. D. **The essential oils of the Queensland flora. Part XXIII. A re-examination of the essential oil of *Melaleuca linariifolia*.** *Papers, University of Queensland, Department of Chemistry* 1 (36), 1949. pp. 12. 21 refs. L.S.

The examination of an oil of a variety of *M. linariifolia* characterized by the presence of 4% 1 : 8-cineole has established the presence of the following constituents: α-thujene, α-pinene, β-pinene, myrcene (?), 1 : 8-cineole, α-terpinene, *p*-cymene, γ-terpinene, terpinolene, terpinene-4-ol, α-terpineol, aromadendrene, cadinene, a new sesquiterpene alcohol $C_{15}H_{26}O$, for which the name melalinol is suggested, and some phenolic material.

1503. KAPLAN, J. **Extraction of essential oil from *Eucalyptus*.** *Forest, Palestine* No. 2, 1950 (10–2, *Suppl.* 2–3). [Heb.e.]

Preliminary account of research being done at the Agricultural Research Station, Rehovoth, on the oil content of both twigs and leaves from old trees and coppice. The material was dried in the open, under shade, and extraction (described) took from 3 to 8 hours according to species. Results for 12 spp. are tabulated. The most promising yielders were *E. pulverulenta, staigeriana, maideni* and *globulus*.

1504. PENFOLD, A. R. **The volatile oils of the Australian flora.** Australian and New Zealand Association for the Advancement of Science. 1950. pp. 172. 60 refs. P.R.

A review of the literature, including information on the chemical nature of oils from Australian plants (e.g. *Backhousia* spp., *Boronia* spp., *Baeckea* spp., *Eucalyptus* spp.), the nature of many recently isolated substances, and the implications of the physiological forms of the Australian flora. [Cf. *For. Abstr.* 11 (No. 2184).]

1505. KRISHNA, S., and BADHWAR, R. L. **Aromatic plants of India. Part XII. Family 46. Myrtaceae.** *J. sci. industr. Res. India* 8 (12), 1949 (*Suppl.* 195–220). [Forest Research Institute, Dehra Dun.] D.S.I.R.

Covers *Baeckea* spp., *Callistemon* spp. and *Eucalyptus* spp. Includes descriptions of 90 species of *Eucalyptus* with notes on their growth in India and tables showing characteristics of their oils.

1506. KRISHNA, S., and BADHWAR, R. L. **Aromatic plants of India. Part X. Family 41. Rosaceae.** *J. sci. industr. Res., India* 8 (10), 1949 (*Suppl.* 61–86). [Forest Research Institute, Dehra Dun.] D.S.I.R.

Covering *Crataegus, Geum, Prunus, Pyrus, Rosa*, and *Rubus* spp.

1507. SVOBODA, G. H., and PARKS, L. M. **Chemical investigation of the volatile oil of *Litsea guatemalensis* Mez.** *J. Amer.*

pharm. Ass. 39 (4), 1950 (204–7). 16 refs. [University of Wisconsin, Madison.] O.R.S.

1,8 cineole and *dl*-carvone were isolated and the presence of linaloöl was demonstrated. The oil contains 49·6% cineole. *From authors' summary.*

1508. JENSEN, W. **A study of the neutral fraction of tar from the outer bark of Birch.** *Pap. ja Puu* 32 (6), 1950 (168–72). 16 refs. [E.] [Institute of Wood Chemistry, Abo, Finland.] P.R.

The neutral oil from the outer bark of Birch has a composition indicating a non-aromatic nature. It seems to consist of a mixture of mostly unsaturated aliphatic and hydro-aromatic products of degradation of suberin and betulinol. No chemical individual could be isolated. The oil was resolved by chromatography into three fractions. The neutral oil is dark brown and has a not unpleasant odour; it is easily emulsified. The distillates are clear oils.

1509. DEVINE, J. **The composition of stillingia oil and the presence therein of 2 : 4-decadienoic acid.** *Journal of the Science of Food and Agriculture, London* 1 (3), 1950 (88–92). 13 refs. [Lever Bros., Unilever Ltd., Port Sunlight.] O.R.E.

The presence of 2 : 4-decadienoic acid is possibly connected with the drying and polymerizing properties of stillingia [*S. sebifera*] oil.

1510. SMITH, B. A., and DOLLEAR, F. G. **Oil from Calabash seed, *Crescentia cujete* L.** *Journal of the American Oil Chemist's Society, Chicago* 24, 1947 (52–4). *Chem. Abstr.* 41 (7), 1947 (2259). O.R.S.

A chemical analysis.

1511. MUNGUIA, R. R., MILLARES, R., GURLEY, N. F., and LLOYD, W. R. **Fixed oils of Mexico. II. Caoba (*Swietenia macrophylla* King). III. Habilla de San Ignacio (*Hura polyandra* Baill.). IV. Napahuite (*Trichilia hirta* L.). V. Mamey (*Calocarpum mammosum* L.).** *Journal of the American Oil Chemists' Society, Chicago* 26 (8), 1949 (431–5). 5 refs. [Armour Research Foundation, International Division, Mexico, D.F.] D.S.I.R.

1512. PARIHAR, D. B., and DUTT, S. **Chemical examination of the fixed oil of *Artemisia scoparia* Kit. and Waldst.** *Indian Soap Journal, Calcutta* 15 (7), 1950 (161–5). 4 refs. L.S.

The flowering heads have been found to contain 4·45% of a fixed oil, m.p. 49–51° C., containing mostly stearic, palmitic, arachidic, linoleic, oleic and myristic acids.

1513. NADKARNI, M. D., AIRAN, J. W., and SHAH, S. V. **Fat from seeds of *Vangueria spinosa* (Rubiaceae).** *Journal of the Indian Chemical Society, Calcutta* 24, 1947 (25–30). O.R.S.

A chemical analysis.

1514. HILLIS, W. E. **Chromatographic analysis of Eucalypt kinos.** *Nature, Lond.* 166 (4213), 1950 (195). 6 refs. [Division of Forest Products, C.S.I.R.O., Melbourne.]

Describes the method of analysis and the solvent mixtures tried. The kinos of *Eucalyptus calophylla, E. corymbosa* and *E. goniocalyx* were resolved into 12, 13, and 11 components respectively.

1515. HIRST, E. L., HOUGH, L., and JONES, J. K. N. **The structure of *Sterculia setigera* gum.** *Journal of the Chemical Society, London* Dec., 1949 (3145–51); Apr., 1950 (1199–1203). [The University, Bristol.] O.R.S.

1516. RAM, J. S., and RAO, P. L. N. **Occurrence of D-mannitol in the exudation of *Olea glandulifera*.** *Curr. Sci.* 18 (11), 1949 (404). 1 ref. [Indian Institute of Science, Bangalore.] A.P.B.

The manna-like exudate is thought to be caused by incisions made by insects. Its aqueous solution was found to contain D-mannitol in about 95% yield on the basis of water-soluble solids.

34.27. Seeds. Fruits. Leaf Fodder

See also *For. Abstr.* 12 (Nos. 1022, 1039, 1285).

1517. GAUSSEN, H., and ROUQUETTE, A. Valeur alimentaire et utilisation des farines de glands. **[Nutritive value and utilization of acorn flour.]** *Trav. Lab. for. Toulouse* 1 (4) Art. 30, 1949. pp. 17. 3 refs. [F.] *Repr.* from *Bulletin de la Société d'Histoire Naturelle de Toulouse* 84, 1949.

1518. TALLARICO, G. Il valore alimentare della ghianda. **[The food value [for man]**

of the acorn.] *Ital. agric.* 87 (6), 1950 (361–3). [It.] E.M.B.

1519. Acosta Solís, M. La Tagua. **[Vegetable ivory.]** Publicaciones Científicas, Quito. 1944. pp. 37 + 9 drawings + 6 photos. [Span.]

Cf. *For. Abstr.* 10 (No. 632).

1520. Greenway, P. J. **Vegetable fibres and flosses in East Africa.** *E. Afr. agric. J.* 15 (3), 1950 (146–53).

Lists some 250 species (distinguishing exotics) by their major uses, the more valuable being described in some detail. Those of forest interest include *Boehmeria*, *Bombax*, *Brachystegia*, *Ceiba*, *Ficus*, *Funtumia* and *Lasiosiphon* species.

1521. Montagnac, R. Sur la culture du kapokier (*Ceiba guineensis* var. *clausa*) à Madagascar. **[The cultivation of *Ceiba guineensis* var. *clausa* in Madagascar.]** *Rev. int. Bot. appl. Agric. trop.* 29 (325/6), 1949 (607–9). [F.] P.R.

Notes on first attempts at starting the cultivation of *Ceiba guineensis* var. *clausa* in Madagascar.

1522. Collins, W. F., and Wild, H. **Poisonous plants of the Marandellas district.** *Bull. Minist. Agric. Lds. S. Rhod.* No. 1514, 1950. pp. 21 + 20 drawings. 14 refs.

Among the plants listed and discussed are the following trees and shrubs: *Nerium oleander*, poisonous to both humans and animals; *Euphorbia ingens*, dangerous to cattle in parts of the low veld; *Solanum incanum*, unripe fruits poisonous to both humans and animals; *Mundulea sericea*, bark and roots containing a powerful fish poison; *Ricinus communis*, seeds dangerous to both humans and animals; and *Melia azedarach*, poisonous to stock and dangerous to children.

1523. Jurriaanse, A. **Fodder trees.** *Fmg. S. Afr.* 25 (291), 1950 (181–8). E.M.B.

Notes on species suitable for South Africa, their silvicultural characters and methods of propagating them.

1524. Turbet, C. R., and Thuraisingham, K. **Feeding trials with the sensitive plant *Mimosa pudica*.** *Trop. Agriculturist, Ceylon* 104 (2), 1948. (81–6). 4 refs. O.R.E.

Pastures containing *M. pudica* proved to have greater nutritive value for grazing cattle than Mimosa-free pasture.

34.28. Bamboos. Canes

See also *For. Abstr.* 12 (Nos. 954, 1162, 1334).

1525. Heck, G. E. **Properties of some Bamboos cultivated in the Western hemisphere.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1765, 1950. pp. 13 + 2 photos, 1 dgm., 14 gphs., 9 tbls. 7 refs. P.R.

Results are given of tests on the strength, swelling, moisture, anti-shrink efficiency, gluing and preservative treatment of *Bambusa arundinacaea*, *B. tulda*, *Dendrocalamus strictus*, *Bambusa vulgaris*, *B. tuldoides*, and *Guadua angustifolia*.

1526. Ramaswami, S. **Indian canes (rattans).** *Indian For.* 76 (4), 1950 (159–63). 12 refs.

A short note on canes [*Calamus* spp.] with special reference to preparation of the canes for market, and artificial regeneration.

34.3. *Products of the Animal Kingdom*

See also *For. Abstr.* 12 (Nos. 901, 1143, 1651–2).

1527. Sudiro, M. Stoklakcultuur in Indonesië. **[Lac cultivation in Indonesia.]** *Rapp. Bosbouwproefsta., Buitenzorg* No. 28, 1950. pp. 18. [Du.jav.e.]

A brief account of the biology of the lac insect is given. The chief food plants in Indonesia are Kesambi (*Schleichera oleosa*), Widoro (*Zizyphus jujuba*), Ploso (*Butea monosperma*) and Pilang (*Acacia leucophloea*). Colonies should not be established on Kesambi trees younger than 7 years old. Direct and indirect effects of dry weather, strong wind and rain, are discussed. The chief enemies of the insect in Indonesia are chalcid flies (*Erencyrtus dewitzi*, *Tachardiaephagus tachardiae*, and *Tetrastichus purpureus*); others, less harmful, are *Eublemma rubra*, *E. amabilis*, *Cremastogaster treubi*, *Solenopsis geminata*, and Chrysopidae. In dry weather, animals (*Sciurus nototus* and *Macacus cynomolgus*) may damage the plantations. Instructions are given for collecting and sorting the brood lac into 4 grades; the

lowest grade is not used for fresh inoculations. Recommendations are made for the selection of districts and trees for inoculations; the area is divided into blocks of ½ to 1 ha. (according to the quantity of brood lac in the different grades), the blocks lying at a distance of at least 100 m. apart. The height of the trees has not been found to affect the degree of attack by chalcid flies. In good seasons, a crop of 23 times the brood lac used for inoculation can be expected.

38. CONSTRUCTIONAL WORKS ENGINEERING

See also *For. Abstr.* 12 (Nos. 1207, 1211–3, 1226 *et seq.*, 1387).

38.2. *Building Construction. Foundations and Superstructures*

1528. HOFFMANN, D. B. Das Holz in der englischen Bautechnik. [**Timber in the British building industry.**] *Weltholzw.* 2 (1), 1950 (6–7). [G.g.] P.R.

1529. **The use of timber for building work in Scotland.** (**Economy memorandum No. 2.**) *Minist. Wks., Lond.* 1950. pp. 19. P.R.

Includes sections on timber licensing, restrictions on the use of softwood, and a list of British Standards applicable to timber and timber products. The appendixes include tables of maximum sizes in which timber is to be used for joists, rafters, purlins and floor boards, and sections on timbers commonly available in U.K., as well as a note on substitution of hardwood for softwood.

1530. GRANHOLM, H. Om sammansatta balkar och pelare med särskilt hänsyn till spikade träkonstruktioner. [**On composite beams and columns with particular reference to nailed timber structures.**] *Handlingar, Chalmers tekniska Högskola, Göteborg* No. 88, 1949. pp. 214. 41 refs. [Sw.e.] Price *Kr.*12. L.S.

A theoretical and experimental investigation of composite beams and columns is presented. The behaviour of similar structures is influenced, perhaps determined, by the elastic properties or modulus of displacement (defined as the relationship between load and displacement) of the connecting material, in the form of nails, bolts or timber connectors. A theory based on the assumption of a constant modulus of displacement is developed and applied to the analysis of beams under various conditions of loading and to a discussion of the elastic stability of columns under compressive load. The validity of the theoretical results is checked by numerous tests on beams and columns. Many building codes are shown to be unsound because no allowance has been made for the modulus of displacement of the connecting material. The stress distribution in spliced joints is shown to be a function of the number of nails, their modulus of displacement, their spacing and the area of the members connected. There is good agreement between theory and test results. The theory is expanded to cover glued spliced joints and joints between the reinforcing bars in concrete. Results of experiments on curved latticed struts and of long-time loading tests on nailed latticed columns are tabulated and discussed. *From author's summary.*

1531. HECK, G. E. **Comparative tests of nailed built-up beams of various constructions.** *Sth. Lumberm.* 180 (2260), 1950 (58, 60).

Presents test results showing that built-up beams with diagonals instead of a centre lamination have an average deficiency in maximum load of 42% as compared with controls consisting of 3 solid laminations. Beams with butt joints were, on the average, 13% deficient at maximum load. Deflections were considerably greater at a given load for beams with diagonals and butt joints than for beams with solid laminations.

1532. KENNEDY, D. E. **Some problems in the design and performance of laminated wood trusses.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (307–17). [Canadian Forest Products Laboratory, Ottawa.] P.R.

The construction of an arch of White Spruce glued with casein glue, with a 47-ft. span and designed for use in a testing laboratory, is described. A dead load of 7,400 lb. was aplied to the whole arch, and a snow load to the south half-arch, making a total superimposed load of 27,800 lb. After the full live load had been applied, an overload was added gradually. Deflection measurements and temperature readings were made over a period

of 15 months. The arch appeared to be overloaded under a continuous load of 48,600 lb. except when the temperature was well below freezing point, and under a load of 27,800 lb. when the temperature exceeded 50° F. Under normal conditions, however, the arch would be called upon to support the dead load only, for most of the year, a small snow load for 2–3 months of the year and a maximum snow load very rarely, probably for *ca.* ½% of the life of the arch. It is thought that the arch would be adequate for these conditions. [Cf. *For. Abstr.* 11 (No. 2217).]

1533. PEDERSEN, A. V. **Glued laminated Wej-Weld frames.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (327–36). P.R.

The Wej-Weld frame construction is described. The use of a gusset to join a stud or column to a rafter or beam allows the manufacture of frames of any required shape. The gusset, generally made of thick plywood, is shaped with 2 or more sloping scarfs in each end which fit into similar scarfs in one end of the rafter or stud. All joints are scarfed and glued. Frames can be made in clear spans up to 60 ft. They can be produced more economically than the standard glued laminated arch.

1534. Utilisation de la colle dans la charpente. [**Use of glue in framework.**] *Rapp. Lab. Inst. nat. Bois* 1948–9 (62–7). 1 ref. [F.] P.R.

The results of strength tests on different types of glued assemblies, after exposure to drying and wetting cycles, are tabulated.

1535. SELBERG, A. **Buckling of composite columns of wood.** *Transl. For. Prod. Aust.* 1949. pp. 8. Transl. by K. L. Cooper & S. Walker from *Teknisk Tidskrift, Norrköping* Sept. 25, 1948 (619–21). [*For. Abstr.* 11 (No. 3211).] P.R.

1536. BOYD, L. L., DALE, A. C., and GIESE, H. **The effect of moisture content of wood on the withdrawal resistance of roofing nails.** *Agricultural Engineering, St, Joseph, Mich.* 31 (4), 1950 (178–81, 183). 8 refs. C.G.B.

[Cf. *For. Abstr.* 12 (No. 1428).] Experiments were made with different kinds of steel and aluminium nails in 2- and 1-in. timber at different moisture contents. Results are given in graphs and tables, and the following conclusions are drawn: (1) Plain- and barb-shank nails lose some of their withdrawal resistance after the wood changes in moisture content, and regain only a little of the loss when the wood returns to the moisture content of driving. (2) Ring-shank nails give significantly better results; there is little change in withdrawal resistance with moisture content, but resistance tends to increase with lower moisture content. (3) Combination ring and screw-shank nails give similar results to ring-shank nails. (4) Screw-shank nails with shorter leads tend to show increased withdrawal resistance with decreasing moisture content; these with longer leads resemble plain-shank nails. (5) Treatment with Alrock (a chemical means of obtaining a surface treatment to increase frictional resistance) and etching of aluminium plain-barb- and screw-shank nails, increases their withdrawal resistance. (6) Generally, ring- and combination-shank nails give best results for withdrawal resistance, deflection and driving power.

38.6. *Drainage*

See also *For. Abstr.* 12 (No. 1438).

1537. LUKKALA, O. J. Metsäojien kunnossapito. [**Maintenance of forest drains.**] *Metsätietoa, Helsinki* 1949 (1), (15–24). [Fi.] (*Suppl.* to *Metsälehti*, Helsinki 1949 (No. 38).)

Practical notes as reminders to foresters and forest owners, including a rating system for difficulty of work and examples of how to calculate wages and costs.

4. FOREST INJURIES AND PROTECTION

1538. SCHWERDTFEGER, F. Die Waldkrankheiten: ein Lehrbuch der Forstpathologie und des Forstschutzes. [**Forest diseases and pests: a textbook of forest pathology and forest protection.**] Paul Parey, Berlin. 1944. pp. xvi + 479. Many refs. [G.] Price *DM*45.

Cf. *For. Abstr.* 12 (No. 670).

42. INJURIES FROM INORGANIC AGENCIES, EXCLUDING FIRE

1539. THULIN, I. Beskadigelser av Douglasgran (*Pseudotsuga taxifolia*) i Danmark i vinteren 1946–47. [**Damage to Douglas Fir in Denmark during the winter of 1946–7.**] *Forstl. Forsøgsv. Danm.* 19 (4), 1949 (285–329). [Dan.e.]

In Denmark the winter of 1946–47 was characterized by a protracted period of severe frost, and drought lasting from October 1946 to June 1947. Numerous stands of Douglas Fir were badly damaged during the period. Many immature terminal shoots died, and, more seriously, there was much needle shedding and many trees were completely bare in the spring of 1947. Some trees died, while others produced fresh shoots and continued to grow, although increment was reduced for a time. Needle fall occurred only in stands previously attacked by *Phaeocryptopus gaeumanni* and was directly proportional to the intensity of the fungus infection. Shoots that had been attacked shed their needles, and others on the same tree that had not been attacked kept theirs. Trees whose provenance was the Olympic National Forest near Louella, Wash., seemed the most resistant to frost and to fungus attack. The planting of Douglas Fir in mixed stands with Norway Spruce is recommended. Tables with English captions are given, showing the area under Douglas Fir in 1947, details of the material examined, temperatures and rainfall for Oct. 1946 to June 1947 and the extent of the damage.

42.1. *Air Currents*

1540. M., C., and M., I. **Windblown Sitka Spruce.** *Quart. J. For.* 44 (3), 1950 (149–50 + 2 photos).

Stands of Sitka Spruce in Kyloe Wood, Northumberland, were devastated by windthrow during gales in Dec. 1949. The trees had been defoliated for several years in succession and it is considered that this may have weakened their roots.

1541. HOCKING, G. H. **Compression failure in *Pinus radiata* stems exposed to strong wind.** *N.Z. J. For.* 6 (1), 1949 (65–6). 1 ref.

In *Pinus radiata* stands damaged by a severe gale in 1947, stem breakage rather than uprooting was the characteristic injury. Some trees were left standing with a lean. Generally this was not due to partial uprooting, but rather to a permanent bend, most pronounced in the first 10 ft., but occasionally present higher in the stem, and caused by compression failure on the side away from the wind. When trees so affected were sawn, timber from the damaged zone, which often extended well towards the centre of the tree, had to be discarded. Another effect which began to be apparent after about a year, was the falling of such trees as the result of wind, usually from a different quarter from that of the original gale. Examination of trees that broke off during the gale showed that compression failure had occurred in most before the final rupture of the opposite side in tension.

42.2. *Temperature Influences*

See also *For. Abstr.* 12 (Nos. 924, 947).

1542. OUDEMANS, T. C. Enige opmerkingen over nachtvorst. [**Observations on night frost.**] *Ned. Boschb.-Tijdschr.* 20 (10), 1948 (286–7). [Du.]

The possible advantages (in increased vigour and reduced danger of attack by *Phomopsis pseudotsugae*) and costs of cutting back severely frosted young Douglas Fir are discussed.

42.3. *Precipitations*

1543. YEAGER, L. E. **Effect of permanent flooding in a river-bottom timber area.** *Bull. Ill. nat. Hist. Surv.* 25 (2), 1949. pp. 65. 5 refs.

[Cf. *For. Abstr.* 8 (No. 2698).] The effect of water impoundment on timber was studied over an 8-year period (1939–46), on an area of 2,200 acres at the junction of the Mississippi and Illinois rivers. About 600 acres of this were flooded permanently by the Alton Dam impoundment, the average summer water table being raised 3 ft. Before flooding, Silver Maple (*Acer saccharinum*) was the dominant species, and American Elm (*Ulmus americana*), Pin Oak (*Quercus palustris*), Pecan (*Carya illinoensis*), White Ash (*Fraxinus americana*); River Birch (*Betula nigra*), Cottonwood (*Populus deltoides*), Black Willow (*Salix nigra*), Persimmon (*Diospyros virginiana*), Hackberry (*Celtis laevigata*), and Water Locust (*Gleditsia aquatica*) were common; important shrubs were Button Bush (*Cephalanthus occidentalis*), Water Privet (*Forestiera acuminata*) and Holly (*Ilex decidua*). Within 8 years almost all trees were killed in the areas that were actually flooded; with most species, flooding to a depth of 20 in., enough to cover the root collar, was fatal. Pin Oak was the most susceptible species, all trees dying within 3 years. White Ash proved the most resistant, trunk sprouts appearing on some individuals 8 years after inundation. In 6 years, most species showed 100%, Water Locust 96% and Black Willow 43·5% mortality. Water Privet showed 85% mortality 8 years after flooding; Button Bush showed a survival of 40% or more except when deeply submerged. Diameter of trees and shrubs had little influence on their death rate. Tree mortality in mud followed the same pattern as in water but was less heavy. In land above mud level only Pin Oak suffered much from the 3-ft. rise in the water table. Trees with roots flooded on one side only, died first on that side of the tree. Falling of dead timber became noticeable 3 years after flooding; species with durable heartwood, especially Pin Oak, showed the greatest resistance to trunk fall.

The effect of the flooding on the animal and bird population of the area is briefly discussed.

43. FOREST FIRES

See also *For. Abstr.* 12 (No. 1001).

1544. NUNBERG, M. Pożary leśne i ich zwalczanie. [**Forest fires and their control.**] *Ulotk. Wydaw. pop. (Ser. C) Inst. Bad. Leśn.* No. 25, 1948. pp. 37. [Pol.]

A popular booklet dealing with: the causes and classification of forest fires, their localization and suppression, regulations to be complied with during and after their suppression, and preventive measures.

43.0 *Predisposing Factors and Causes*

1545. BEALL, H. W. **Forest fires and the danger index in New Brunswick.** *For. Chron.* 26 (2), 1950 (99–114). 11 refs.

An analysis of the relationship between the degree of forest fire danger as determined from weather observations, and actual fire characteristics, was made from data on 1822 fires occurring in New Brunswick between 1936 and 1946, in particular on 966 man-caused and dry-lightning fires that started within 25 miles of a weather station. Data obtained are tabulated. The analysis shows that the danger-rating system is highly reliable when applied within 25 miles of a weather station, useful at distances between 25 and 100 miles, and quite unreliable at distances exceeding 100 miles. Certain characteristic differences were found between the 5 forest districts of New Brunswick, and between the spring, summer and autumn danger periods.

43.1. *Protective Measures (including controlled burning)*

See also *For. Abstr.* 12 (Nos. 1071, 1074–5, 1077).

1546. **The status of research on forest-fire protection problems recommended for study by associations of the forest industries in Canada.** *Woodl. Sect. Mem. Canad. Pulp Pap. Ass.* No. 16–50, 1950. pp. 9.

1547. **Quebec limit holders protect forests. A review of the work [in fire protection] done in 1949 by the private forest protective associations in the province.** *Pulp Paper Mag. Can.* 51 (6), 1950 (115–6, 118).

1548. **Newfoundland timber.** *Fire Prot., Lond.* 13 (117), 1950 (324–5). P.R.

Description of measures taken by the Bowater organization to guard its woods in Newfoundland against fire damage.

1549. KOROLEFF, A. **Aerial means of forest fire suppression.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 82 (*F*–3), 1950. pp. 8. 22 refs.

A discussion of achievements, with suggestions for profitable lines of research.

1550. **History of smoke jumping, 1939–49.** *Fire Control Notes* 11 (3), 1950 (1–11).

1551. BOYLE, A. A. **Crew and camp organization on the actual fire line.** *Pulp Paper Mag. Can.* 51 (6), 1950 (132, 134).

1552. MCCOLL, B. J. **Power pumps for forest fire fighting.** *Pulp Paper Mag. Can.* 51 (6), 1950 (126, 128, 130).

Brief descriptions of various types of N. American pump.

1553. La lutte contre les incendies de forêts: un nouveau puits foré instantané. **[The fight against forest fires: a new instantaneous well-borer.]** *Rev. for. franç* 1950 (7/8), (408–10). [F.]

The drill, which is driven by water and is attached to a water tank and a motor pump, is for use in sandy soils with a watertable not more than 4m. from the surface. It consists of a copper tube with a rose and a diamond point at the lower end, and 2 nozzles which can be closed in turn at the top. Water is forced from the tank down a flexible pipe through one of the nozzles and down to the point; the force of the water through the rose throws the sand aside and drives the pipe downwards. The other nozzle is then linked by a pipe to the motor pump, and a regular flow of 10,000 l./hr. is obtained by suction. The reserve of water necessary for the drilling, which takes only a minute, is 150 l. The description is illustrated with diagrams and a photograph.

43.2. *Fire Insurance*

1554. WRIGHT, W. G. **Forest fire insurance in eastern Canada.** *Pulp Paper Mag. Can.* 51 (6), 1950 (136, 138–40).

Records of forest fire losses in eastern Canada show that there is a sound basis for insurance of standing timber. Work is now being carried out to organize a joint stock company to provide this insurance on a mutual basis, i.e. with each stockholder in the company a policy-holder and policy-holders sharing in the profits. Records over a 20-year period indicate that the burning ratio on an area basis is higher in regenerating areas than for standing timber. It seems advisable therefore to confine the insurance at first, to standing timber.

1555. WRIGHT, W. G. **Further discussion concerning forest fire insurance.** *Timber of Canada* 10 (10), 1950 (33–4, 56, 58).

43.3 *Fire Damage*

See also *For. Abstr.* 12 (No. 1102).

1556. PREBBLE, M. L., and FYTCHE, R. F. **Value loss through degrade in fire-killed Pine.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (2), 1950 (1–2).

A special study of mill output and grade of the lumber from fire-killed trees was undertaken in November 1949. Trees killed by crown fire in 1948 and others dying gradually during the next year or more as a result of injury to the roots and butt, were investigated. Decay of the heartwood antedating the fire and responsible for cull or reduced grade was prevalent in White and Jack Pine but uncommon in Red Pine. Deterioration following death was caused by the larvae of wood-boring beetles and by sap-staining fungi. Value loss in White and Red Pine trees that were dying gradually during 1949 averaged only 2·4% and 4·4% respectively. Value loss in White Pine killed outright in May 1948 was related directly to the original quality and value of the lumber: e.g. the loss was about 12% on logs whose original value was $53.00/M. bd. ft. but increased to 57% in logs having an original value of $121.00/M. bd. ft. For Red Pine, value loss varied from 8 to 18% in different stands, but there was no direct relationship between loss and original value. Value loss in overmature Jack Pine averaged about 5%.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

44.1 *Forest Weeds*

See also *For. Abstr.* 12 (Nos. 1092, 1117–8).

1557. JUHREN, G., and EATON, V. **Ammonium sulfamate as a brush-killer.** *J. For.* 48 (7), 1950 (498).

An experiment was made in 1948 in controlling brush along roadsides in California by

spraying with ammonium sulphamate. Spraying was done to a width of 5 yards on both sides for a distance of 3,550 ft. Using a solution of 1 lb. Ammate/gal. water, the job required 350 lb. Ammate and took 2 men 6 hours to do. Cost of material was $63.00 and of labour $24.00. There was a practically 100% kill, but a second spraying would be necessary to prevent all re-sprouting. The sprayed area now supports a ground cover of grasses and herbaceous plants of sufficient density to prevent erosion.

1558. DAY, M. W. **How to control undesirable trees and shrubs.** *Quart. Bull. Mich. agric. Exp. Sta.* 32 (4), 1950 (486–91). 4 refs.

Methods of control by mechanical means (cutting, burning, disking, ploughing and bulldozing, and girdling) are discussed very briefly and chemical control (with 2,4-D and 2,4,5-T) is discussed more fully. Concentrations are recommended and methods and season of foliage spraying discussed. Ammonium sulphamate gives good results, especially against more resistant species such as Oak and Ash, but is far more expensive than 2,4-D and 2,4,5-T. Where resistant species are predominant, the use of 2,4,5-T sprayed on the top and sides of cut stumps is recommended; a concentration of *ca.* 4,000 p.p.m. in diesel oil is suitable. The dormant spraying of shrubs is still in the experimental stage; solutions of 4,000–8,000 p.p.m. of an ester of 2,4,5-T or 2,4-D in diesel oil, applied to the stems from the base to a height of about 3 ft. before any sign of growth activity in spring, are recommended. [Cf. *For. Abstr.* 10 (No. 2586).]

1559. **Results of basic research on Mesquite.** *Rep. Sthwest. For. Range Exp. Sta. 1949*, 1950 (20–30).

Summarizes results of a long-term joint programme of research with the Arizona Agricultural Experiment Station. The following subjects are dealt with:—Susceptibility of Mesquite [*Prosopis juliflora*] to 2,4-D and 2,4,5-T; effect of injection of chemicals into sap stream of Mesquite; resprouting in relation to season of girdling or burning, seasonal development and production of seed; dissemination and germination of seed; effect of planting depth and soil texture on seedling emergence; mortality of seedlings on range land; and rate of establishment. [Cf. *For. Abstr.* 10 (Nos. 684–5); 11 (Nos. 285, 2259–60).]

1560. BOUVAREL, P. Le débroussaillement par les herbicides sélectifs à base de 2,4-D. **[Killing forest weeds with weed-killers based on 2,4-D.]** *Rev. for. franç.* 1950 (7/8), (297–407). 9 refs. [F.]

Experiments were made over a period of 2 years, to determine the effect of 2,4-D in the form of commercial selective weed-killers, in keeping fire-breaks and young coniferous plantations clear. Results are tabulated, and show that: (1) *Sarothamnus* [*Cytisus*] *scoparius*, *Betula verrucosa*, and *Robinia pseudoacacia* are sensitive to 2,4-D; they can often be killed by one application, but sometimes a second treatment is necessary in the following year to prevent sprouting; (2) *Calluna vulgaris*, *Erica cinerea* and *Rubus idaeus* recover rapidly; and (3) grasses and conifers (*Larix decidua*, *Pseudotsuga taxifolia*, *Pinus laricio* var. *calabrica*, *Chamaecyparis lawsoniana*, *Abies grandis*, *Picea abies* and *Cryptomeria japonica*) are resistant. Best results were obtained with large doses (2 kg. pure 2,4-D/ha.). The best time for the treatment is late May to early June, in full sunshine and at temperatures of 20–30°C.

1561. B[ARNARD], R. C. **Trials of 2,4-D (sodium salts) in control of certain forest weeds.** *Malay. Forester* 13 (2), 1950 (95).

An aqueous solution of 2,4-D in strengths up to ½ lb./gal. applied as a fine spray, had no effect on Bamboo, *Eugeissona triste*, *Mimosa pudica*, and *Imperata cylindrica*. One application at ½ lb./gal. completely killed *Gleichenia linearis*, but lower concentrations had little or no effect. One application at ½oz./gal. completely killed *Mikania scandens*. Spraying was more effective if done in bright sunshine.

1562. TOIT, R. DU. **Lantana as a weed.** *Fmg. S. Afr.* 25 (290), 1950 (163–4). [Division of Soil Conservation and Extension.] E.M.B.

A short description of *Lantana camara*, originally a cultivated ornamental shrub, but now a serious pest 'escape' in Natal. It smothers indigenous bush, encroaches upon veld and is poisonous to stock. Mechanical eradication has proved simple and effective, but is costly. An effective spray is 2,4,5-T, but this weed-killer is not yet easily obtainable in the open market. *L. camara* has been proclaimed a weed in Natal, and, if it spreads,

the interdict may be extended to the whole Union.

1563. SEWELL, T. G. **Manuka blight survey.** *N.Z. J. Agric.* 79 (2), 1949 (101–4). 4 refs. [Department of Agriculture, Christchurch.] A.P.B.

Brief results of a survey made by the New Zealand Department of Agriculture in co-operation with the Entomology Division of the Department of Scientific and Industrial Research. Five species of scale insect were found on Manuka and Kanuka (*Leptospermum scoparium* and *L. ericoides*). Of these, three were hard scales and appeared to have no effect on plant growth. Death of Manuka is associated with *Eriococcus* sp., a soft scale which seems confined to Canterbury, where it is found under widely diverse climatic conditions. Most susceptible are plants about 3 ft. high, though trees up to 10 ft. high have been killed. No *Eriococcus* was found in North Island. The scale is a possible means of eradicating Manuka, and its life history is being investigated to this end. Another soft scale, *Coelostomidia wairoensis*, occurs on Kanuka, and, to a lesser extent on Manuka in sheltered areas in North Auckland, the Bay of Plenty, Gisborne, Rotorua, and South-western Wairapa. Isolated infestations occur in South Island, in Nelson, Marlborough, and at Peel Forest. Infested trees do not usually die. [Cf. *For. Abstr.* 11 (p. 424).]

44.3. *Fungi*

See also *For. Abstr.* 12 (Nos. 1022, 1063, 1539, 1607).

1564. PEACE, T. R. **Pathology.** *Rep. For. Res. For. Comm., 1948–9*, 1950 (12–8).

Arranged according to the tree genus concerned.

1565. JAGIELSKI, A. Ważniejsze choroby naszych drzew leśnych. [**The more important diseases of our forest trees.**] *Ulotk. Wydaw. pop. (Ser. C) Inst. Bad. Leśn.* No. 29, 1950. pp. 60. [Pol.]

1566. ORŁOŚ, H. Barwne tablice najgroźniejszych chorób drzew leśnych. [**Illustrations in colour of the more destructive diseases of forest trees.**] *Wydaw. pomocn. tech.-gosp. (Ser. B) Inst. Bad. Leśn.* No. 20, 1949. pp. 1 + 16 colour plates. [Pol.]

1567. BAGCHEE, K. **Progress of forest pathology in India during the quinquennium 1944–49.** *Indian For.* 76 (5), 1950 (216–20 + 12 photos, 1 map).

Deals with wood-rotting fungi as well as diseases of living trees.

1568. BAGCHEE, K., and BAKSHI, B. K. **Some fungi as wound parasites on Indian trees.** *Indian For.* 76 (6), 1950 (244–53 + 21 photos, 37 dgms.). 36 refs.

The occurrence and pathology of *Polyporus gilvus*, *Ganoderma lucidum*, *G. applanatum*, *Fomes badius*, *F. rimosus*, *F. senex*, and *F. pini*, are discussed, and the danger of exposing trees to attack by uncontrolled lopping is emphasized. The use as wound dressings of asphalt as a water solution or diluted with various substances, or a mix of dry Bordeaux and raw linseed oil, should prevent the establishment of fungus.

1569. CHOTHIA, H. P. ***Polystictus leoninus* Klotzsch, a wound parasite.** *Indian For.* 76 (7), 1950 (290–1 + 7 photos, 1 dgm.). 5 refs. [Laboratory of Forest Pathology, Dehra Dun.]

P. leoninus has so far usually been recorded as a saprophyte, but in recent years it has been found as a wound parasite on trees in New Forest, Dehra Dun, after the severe frosts of 1945–47. The fungus attacks standing trees of *Boswellia serrata*, and also felled trees and sawn timber. The biology of the fungus is described.

1570. **Effect of pruning on western red rot in young Ponderosa Pine.** *Rep. Sth-west. For. Range Exp. Sta. 1949*, 1950 (47–50).

Further observations confirm the 1947 findings [cf. *For. Abstr.* 10 (No. 244)] and indicate that pruning is highly effective in killing this rot fungus [*Polyporus anceps*] if carried out before the infection penetrates the tight knot for an appreciable distance.

1571. GALOUX, A. La pourriture rouge sur le mélèze du Japon. [***Fomes annosus* rot on *Larix leptolepis* [in Belgium].**] *Bull. Soc. for. Belg.* 57 (7), 1950 (279–81). [F.]

It was found that 10–20% of thinnings from a young stand were affected.

1572. RENNERFELT, E. **The effect of some antibiotic substances on the germination of the conidia of *Polyporus annosus* Fr.**

Repr. from *Acta Chemica Scandinavica, Copenhagen* 3, 1949 (1343–9). 23 refs. [E.e.] P.R.

It was found that gladiolic acid, mycophenolic acid, and viridin, are very effective against the conidia of *P. annosus*, surpassing $HgCl_2$ in this respect. In most cases the effect is greater at pH 3·6 than at pH 5·0. Germination is also inhibited by pinosylvin. No substance with similar properties has been found in Spruce wood. [Cf. *For. Abstr.* 9 (No. 2277); 12 (No. 710).]

1573. DAVIDSON, R. W. **A Western White Pine twig canker.** *Plant Dis. Reptr.* 34 (4), 1950 (99). A.P.B.

The fungus *Curcurbidothis pithyophila* was found fruiting on numerous cankered areas of small twigs of *Pinus monticola* near Nakusp, British Columbia, in 1949. Previous records of its occurrence on *P. flexilis* in Idaho, 1917, and on *P. monticola* in Columbia National Forest, Washington, in 1942, suggest that it may be widespread in the Western White Pine area.

1574. HIRT, R. R. **Spruce canker. (A disease of Colorado Blue Spruce, Koster Blue Spruce, and Norway Spruce [caused by *Cytospora kunzei*].)** N.Y. St. Coll. For. [*n.d.*] pp. 5. P.R.

1575. THOMAS, W. D. **New shade tree diseases in Colorado.** *Plant Dis. Reptr.* 34 (3), 1950 (83). 1 ref. [Colorado Agricultural Experiment Station, Fort Collins, Colorado.] A.P.B.

Verticillium albo-atrum has been isolated from a specimen of Ash, and a fungus, identified tentatively as *Alternaria tenuis*, from *Rhus typhina*. An unidentified species of *Fusarium* was found on two adjacent trees of *R. typhina*; the trees showed no marked discoloration of the vascular system, but wilted during the afternoon heat and recovered at night. Dithane *Z*-78 was applied at the base of one of the trees at the rate of 5 lb./100 sq. ft.; the dust was worked into the soil and the treated area was soaked thoroughly. In spite of excessive heat, all symptoms of wilt disappeared from this tree within 3 weeks. The untreated tree wilted further and died before the end of the summer.

1576. BIRAGHI, A. Il cancro della corteccia del castagno può colpire anche le querce? [***Endothia parasitica* can also attack Oak!**] *Monti e Boschi* No. 3, 1950 (129–32). [It.]

Bark cankers caused by *E. parasitica* have been found in Italy on *Quercus sessiliflora* and *Q. pubescens*.

1577. **[A map showing] distribution of Oak wilt [caused by *Chalara quercina*] in the United States.** *Plant Dis. Reptr.* 34 (3), 1950 (80). A.P.B.

Compiled from State reports to the Division of Forest Pathology.

1578. CARTER, J. C. **Oak wilt in Illinois.** *Plant Dis. Reptr.* 34 (3), 1950 (81–2). [Illinois Natural History Survey, Urbana.] A.P.B.

1579. FRENCH, D. W., and CHRISTENSEN, C. M. **Oak wilt in Minnesota.** *Plant Dis. Reptr.* 34 (3), 1950 (82). [University of Minnesota, University Farm, St. Paul.] A.P.B.

1580. WATERMAN, A. M., and CASH, E. K. **Leaf blotch of Poplar caused by a new species of *Septotinia*.** *Mycologia* 42 (3), 1950 (374–84). 5 refs. P.R.

Septotinia populiperda sp. nov. causes leaf blotch on young plantation trees of hybrid Poplar clones in the eastern U.S.A., resulting usually in extensive defoliation. Poplar leaves of 5 hybrid clones and of 2 species were inoculated with a suspension of ascophores. Typical leaf blotches with sporodochia and conidia were produced on 2 clones of the hybrid *Populus charkoviensis* × *P. trichocarpa*. *From authors' summary.*

44.4. *Virus Diseases*

1581. SMOLÁK, J. Virové choroby a listy. [**Virus diseases and leaves.**] *Ochr. Rost.* 22 (5/6), 1949 (173–203 + 14 plates). 15 refs. [Cz.russ.e.] E.M.B.

Describes and discusses leaf deformations, leaf reductions etc. caused by virus diseases, with chief reference to *Rubus idaeus* but including notes on *Tilia cordata* and *Acer* spp., especially *A. pseudoplatanus*.

45. DAMAGE BY ANIMALS

45.1 *Mammals*

See also *For. Abstr.* 12 (No. 1121).

1582. ARBOGAST, C. JR. **Damage to natural reproduction by deer browsing [in Wisconsin].** *Tech. Notes Lake St. For. Exp. Sta.* No. 332, 1950. pp. 1.

Observations were made on 606 $\frac{1}{5}$-acre plots and the amount of deer browse on (1) northern hardwoods, (2) Hemlock, (3) other upland types, and (4) swamp, are compared.

1583. CONWAY, M. J. **Deer damage in a Nelson Beech forest.** *N.Z. J. For.* 6 (1), 1949 (66–7 + 1 photo).

Gives evidence, from sample plots, of damage by deer to natural regeneration of *Nothofagus* spp.

1584. PRACY, L. T., and KEAN, R. I. **Control of opossums an urgent problem.** *N.Z. J. Agric.* 78 (4), 1949 (353–8). [Wild Life Branch, New Zealand Department of Internal Affairs.] A.P.B.

45.2 *Birds*

See also *For. Abstr.* 12 (No. 1072).

1585. TURČEK, F. Črty z ochrany lesa. **[Notes on forest protection.** *Pol'ana* 4 (6/7), 1948 (233–5). [Slovak.e.]

Personal observations in 1947 on: (1) Injury by woodpeckers (*Dryobates major* and *Picoides tridactylus*) through their characteristic bark punctures, to Austrian Pine and *Sequoia gigantea* in a Slovak arboretum, abetted by squirrels for building their nests. (2) The local control by ants (*Formica rufa*) of an outbreak of *Lymantria dispar* in mixed-Oak state forests. The ants had built up a population density, where no moth eggs could be found, averaging 17 ant-hills/ha. Artificial propagation by transplanting such nests is suggested, to aid control. [Cf. *For. Abstr.* 11 (No. 3314) and 12 (No. 745).]

45.3. *Insects*

See also *For. Abstr.* 12 (Nos. 960–1, 1022, 1033–7, 1120, 1202, 1563, 1585).

1586. LACK, D. **Forest ornithological investigations.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (79–80).

Preliminary report on an investigation of the nesting of titmice in boxes in order to determine: (*a*) whether the tit population can be increased by providing nesting boxes, particularly in planted woodland; and (*b*) the part played by tits in controlling insect pests, with special reference to defoliating caterpillars.

1587. NEVES, C. M. BAETA. Introdução á entomologia florestal portuguesa. **[Introduction to Portuguese forest entomology.]** Livraria Sá Da Costa, Lisbon. 1950. pp. 225. Numerous refs. [Port.] X.

The first and longest part of the book is devoted to studies of pests of the most important Portuguese species, viz. *Pinus pinaster*, *Quercus suber* and *Q. ilex*, and includes biological and morphological studies of the insects, descriptions of the physiological results of their attack on the trees, and, in the case of *Lymantria dispar*, brief instructions for its control. The second part discusses prophylactic methods in protecting from insect attack these and some other species of importance for Portugal.

1588. ELTON, E. T. G. Overzicht der beschikbare gegevens over insectplagen in onze bossen en andere houtopstanden in het jaar 1947. **[Review of available data on insect pests in Dutch forests and other woody growth in 1947.]** *Ned. Boschb.-Tijdschr.* 21 (1), 1949 (6–15). [Du.du.e.]

1589. HADLINGTON, P. **Forest insects and wood-destroying insects of N.S.W. Part I. A. Insects attacking the living tree.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 4 (7/9), [1950] (3–5).

Brief description of 17 species of leaf-eating insects (Lepidoptera, Hymenoptera and Coleoptera).

1590. CONWAY, M. J. **Beetle damage to Beech forest.** *N.Z. J. For.* 6 (1), 1949 (67–8).

A note on outbreaks of a buprestid beetle, *Nascioides ensyi*, in *Nothofagus* forests in New Zealand.

1591. **Replanting of felled coniferous woodland in relation to insects pests.** *Leafl. For. Comm., Lond.* No. 25 (rev.), 1949. pp. 6. Price 2*d*.

See *For. Abstr.* 8 (No. 2121).

1592. JOLY, R. Un ennemi de la forêt renaissante—*Hylobius abietis* L. **[*Hylobius abietis*, an enemy of the renascent forest.]** *Rev. for. franç.* No. 6, 1950 (347–52). [F.]

The restoration of devastated French forests is threatened by the build-up of populations of Pine weevil. Some notes are given on its habits, damage, and methods of control.

1593. Osmolovski, G. E. Lesokhozyaystvennoe znachenie dolgonosikov-smolëvok. [**The significance of *Pissodes* spp. in forestry.**] *Entomologicheskoe Obozrenie, Moskva* 30 (1/2), 1948 (60–7). 6 refs. [Russ.] X.

Lists, with brief notes on distribution etc., the 14 species and varieties of *Pissodes* found in the U.S.S.R., and gives some account of the author's observations on *P. pini* and *P. piniphilus* on Scots Pine, and *P. harcyniae* on Norway Spruce, in the forests of Leningrad Province. Of these the first is regarded as a secondary pest, while the two latter are serious pests on the borderline between primary and secondary types, since the evidence obtained showed that: (1) The adults can and do attack very slightly weakened and quite healthy trees, i.e. they behave as 'primary' pests. (2) The larvae can complete their development only in more seriously weakened trees, as comparatively healthy trees exude enough resin to drown them. In this sense they are 'secondary' pests. (3) The adults, however, continue to feed and lay eggs on the trees on which they and their unsuccessful broods feed. When this process is continued for several years in succession the trees are gradually weakened to the point at which they can no longer exude enough resin to overcome larval attacks, and the larvae can then complete their development.

As weakening of the trees proceeds, the attacks of *P. piniphilus* and *P. harcyniae* are accompanied, and often masked, by those of truly secondary pests, which hasten the process and the eventual death of the trees.

1594. Plumb, G. H. **The adult feeding habit of some conifer-infesting weevils.** *Canad. Ent.* 82 (3), 1950 (53–7). 17 refs. [Conn. agric. Exp. Sta.] O.R.S.

Magdalis austera and *M. hispoides* were found feeding on the needles of *Pinus strobus*. The adult beetle emerges just as the young needles are breaking out of the sheath, and drills through the scales into the succulent young needles. Working from the top of the fascicle towards the base, it leaves a series of punctures, usually on the side nearest to the central bud cluster. The part of the needle distal to the feeding wound turns yellow and bends down at the point of injury. Later in the growing season it falls off, so that the needles appear to have been fed on by a lepidopterous or sawfly larva. Feeding habits of *Cylindrocopturus eatoni* [cf. *For. Abstr.* 12 (No. 961)], *Brachonyx pineti* and *Anthonomus varians* are described and compared. No extensive injury by *Magdalis* spp. has so far been observed. [Cf. *For. Abstr.* 4 (250–1).]

1595. **Arborvitae weevil.** *Rep. R.I. agric. Exp. Sta. 1948*, 1949 (17).

A new pest of nursery stock, discovered on Rhode Island in April 1947, has been identified as *Phyllobius intrusus*, a native of Honshu, the main island of Japan. The adults of both sexes feed on the foliage of *Thuja*, *Chamaecyparis*, and *Juniperus*, and the larvae on their roots. The adult has been controlled with ½lb. wettable 50% DDT in 100 gal. water, sprayed on the foliage when the weevils emerge from the soil in May. If the adults are destroyed before eggs are laid, it is not necessary to treat the soil for control of the larvae.

1596. Vogel, W. Eibildung und Embryonalentwicklung von *Melolontha vulgaris* F. und ihre Auswertung für die chemische Maikäferbekämpfung. [**Egg formation and embryo development of *Melolontha vulgaris* F. and their evaluation for the chemical control of cockchafers.**] *Z. angew. Ent.* 31 (4), 1950 (537–82). 67 refs. [G.g.]

Cockchafer development; anatomical and physiological research on female genitalia and development of the ovum; embryology; estimation of maturity; prognosis for chemical control.

1597. Günthart, G. Die Bekämpfung der Engerlinge mit Hexachlor-cyclohexan-Präparaten. [**Control of cockchafer larvae with '666' preparations.**] *Mitteilungen der Schweizerischen Entomologischen Gesellschaft, Bern* 20 (5), 1947 (409–51). 18 refs. [G.g.f.] [Chemische Fabrik Dr. R. Maag A.G., Dielsdorf-Zürich.] I.I.E.

Comparative tests were made with CS_2, DDT and 666 emulsions, suspensions, and dusts, in nurseries, orchards and fields. The 666 preparations proved most effective, since they not only killed the larvae directly contacted, but afforded subsequent protection to the treated plants against further attack. It was discovered that in the first and second years of the infestation the larvae can be successfully controlled by applying in April suspensions of 0·75–1% 666 at the rate of

7–10 l. per sq. m. or 4–6 l. per linear m. Feeding ceases immediately after treatment, though actual destruction of the larvae proceeds more slowly. The experiments also showed that it is possible to prevent an infestation by treating the soil before oviposition takes place with 2 l. of a 1% 666 suspension per sq. m. When dealing with shallow-rooted plants and a porous soil, the insecticide may be applied by means of a watering can or similar device; otherwise a spray should be used. In fields, effective control was obtained by harrowing in a mixture of about 0·5 kg. 666 dust per are, mixed with a fertilizer, e.g. crude $CaCN_2$. In tree nurseries 1 kg. 666 dust per are is recommended, to be spread before working the soil.

1598. HANSON, H. S. **Entomology.** *Rep. For. Res. For. Comm., Lond. 1948–9*, 1950 (18–26).

Among the subjects dealt with in this report are the following:—

Ips sexdentatus. Infestations which occurred in several coniferous areas in South Wales during 1947, died out, and no fresh ones were reported during 1948. Investigations showed that the resident predator population played an important part in terminating the infestations. *Hypophloeus fraxini*, a non-indigenous species belonging to the family Tenebrionidae, was one of the most efficient predators and was numerous in each area examined. This species has for many years arrived in considerable numbers in the bark of *Ips*-infested pitprops imported from France, and has long been established as a breeding species in South Wales and several localities in South England. Another useful predatory beetle, *Aulonium ruficorne*, family Colydiidae, is present in several areas and probably became established in the same way.

Myelophilus minor. The distribution of this species in Britain was formerly confined to Pine areas in Scotland, but it has recently established itself in Dorset and Hampshire. It is potentially a more dangerous pest than *M. piniperda*, since it can successfully attack trees that are in a condition slightly too vigorous for the breeding purposes of the latter, and because it can more successfully utilize thin-barked material for breeding purposes when necessary. The erroneous popular opinion that *M. minor* prefers to breed in thin bark and confines its attention to this type of material [cf. *For. Abstr.* 10 (No. 2981)] is due to the fact that in the north of Scotland and in Sweden, *M. piniperda* begins to breed earlier in the season, and in districts where it is numerous, the thick bark becomes congested with the egg galleries of this species before *M. minor* begins to breed. In these circumstances the latter is compelled to use thin-barked material which dries out rapidly and causes a high rate of mortality. Large-scale trap-stem experiments showed conclusively that *M. minor* prefers thick bark for breeding purposes and can build up a large population in it.

Chafer-control investigation. Experiments in the prevention of damage by cockchafer larvae, using a dusting compound containing the γ isomer of benzene hexachloride (BHC) were carried out at Rhinefield Nursery in the New Forest. The application of BHC for the protection of transplants gave excellent results, particularly by the root-dusting method. On the other hand, heavy application of BHC in seedbeds of Japanese Larch produced 100% mortality of the plants, and lighter doses produced varying degrees of mortality according to the method of application. Experiments are in progress to ascertain the minimum effective rate of application for protecting the roots of transplants, and the maximum safe rate of application in seedbeds. In every case where heavy infestations of cockchafers occurred in the areas investigated, the nursery was either closely surrounded by woods of broadleaved trees, or had large areas of such trees near by and Beech hedges in the nursery or round its edges. Since adult cockchafers feed on the foliage of broadleaved trees, it is probable that the presence of a liberal supply of suitable food is one reason why certain nurseries are heavily infested. Clearing of adjacent blocks of broadleaved trees has in some cases transformed heavily into lightly infested nurseries.

Examination of over 15,000 chafer larvae from various localities revealed a high percentage (35·8–47·3%) of parasitization by *Dexia rustica* (Tachinidae). This reaches its maximum rate in the autumn, and as unparasitized larvae tend to descend into the deeper layers of soil for hibernation earlier than the parasitized larvae, it seems likely that collection and destruction of chafer larvae in late autumn may result in the destruction of the greater part of the parasite population and actually hinder the work of control. July is

the best time to concentrate on the destruction of chafer larvae in forest nurseries, as there is then little danger of destroying parasite larvae.

1599. SCHIMITSCHEK, E. Berücksichtigung des Reifungsfrasses bei der Bekämpfung des achtzähnigen Fichtenborkenkäfers (*Ips typographus* L.). [**Maturation feeding in the control of *I. typographus*.**] *Pflanzenschutzberichte, Vienna* 2 (9/10), 1948 (129–39). 5 refs. [G.g.] I.I.E.

Observations on maturation feeding of *I. typographus*, with an account of experiments in combating the pest during this phase. A control method is detailed. Traps composed of piles of barked fuelwood are set up and sprayed, when maturation feeding begins, with 1% *E605f*, a 5% Gesarol spray or a 5% Gesarol suspension.

1600. NUNBERG, M. Najważniejsze korniki jodły. [**The principal bark-beetles of Silver Fir.**] *Ulotk. Wydaw. pop.* (*Ser. C*) *Inst. Bad. Leśn.* No. 24, 1948. pp. 30. [Pol.]

A popular booklet describing and illustrating the following species of insects responsible for the progressive disappearance of Fir in Poland: *Pityokteines curvidens*, *P. spinidens*, *P. vorontzovi*, *Cryphalus piceae*, *C. abietis*, and *Xyloterus lineatus*.

1601. HOGAN, J. B. **Forest Service reports damage to Pacific Silver Fir.** *J. For.* 48 (6), 1950 (429).

Stands of *Abies amabilis* in Washington have for some time suffered from an infestation by one or more species of *Pseudohylesinus*, which has now reached epidemic proportions. Mature trees are killed in 2–3 years. Little damage occurs at altitudes above 3,000 ft.

1602. **Black turpentine beetle.** *Rep. Sth. For. Exp. Sta. 1949*, 1950 (29–30).

The black turpentine beetle (*Dendroctonus terebrans*), usually considered of secondary importance, has been found to be killing Pines in the McNeill Forest in S. Mississippi. Most of the killed trees had been vigorous dominants or co-dominants, 8–16 in. in d.b.h. Death occurred 3–6 months after initial attack and mortality has been almost 100%.

1603. CLARK, J. **Bud galls on White Spruce.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (2), 1950 (1).

An account of *Rhabdophaga swainei*. Black Spruce seems to be immune and Red Spruce is only lightly attacked. Two Norway Spruce were examined and found to be as susceptible to attack as native White Spruce.

1604. BALCH, R. E., and UNDERWOOD, G. R. **The life-history of *Pineus pinifoliae* (Fitch) (Homoptera: Phylloxeridae) and its effect on White Pine.** *Canad. Ent.* 82 (6), 1950 (117–23). 3 refs. [Dominion Entomological Laboratory, Fredericton, N.B.] O.R.S.

A detailed life history of *Pineus pinifoliae* [cf. *For. Abstr.* 10 (No. 754)]. Eggs of the fundatrix on Red Spruce (*Picea rubens*) hatch at about the time of the first opening of the normal buds. About the middle of June the galls open and the adults emerge and fly to the needles of White Pine (*Pinus strobus*), preferably to those of the previous year's growth. The second-generation larvae crawl to the new shoots early in July, where they insert their stylets into the axes and remain dormant until next spring. It is at this stage that most damage is done to the new shoots and the outbreak is most easily diagnosed. Early in May the larvae develop into wingless exules and winged sexuparae. The exules begin oviposition about June 1st and produce another generation of larvae by mid-July. It is not known whether the wingless forms continue indefinitely on the Pine; probably they die out or produce sexuparae. The adult sexuparae leave the White Pine about the end of May and settle on old needles of Red Spruce. The larvae of the bisexual form are hatched from the eggs of the sexuparae in early June. At the end of June the adults leave the needles and presumably settle on the twigs, but none was in fact observed, neither were mating or oviposition. Unusual abundance of the insect was first noted in 1942 in New Brunswick, and the outbreak has continued irregularly there, in Nova Scotia and in Quebec. Spruce is little affected, but drooping of affected shoots of White Pine results in some crookedness at the nodes and reduced growth. In sample-plot experiments near Shirley, N.B., White Pine mortality was slight and confined to small trees, but loss of growth was considerable and tended to favour competition by Spruce and Red Pine.

1605. LLOYD, R. C. **Cicada damage in an indigenous forest.** *N.Z. J. For.* 6 (1), 1949 (64–5). 2 refs.

During an inspection of Atuanui State Forest, fairly severe cicada [*Melampsalta* spp.] damage was noted along the forest margins and edges of clearings. Species affected were *Leptospermum scoparium, Dacrydium cupressinum, Podocarpus ferrugineus, P. dacrydioides,* and *P. totara.* It seems probable that, in some localities at least, continual oviposition in regenerating Podocarps may present a serious silvicultural problem. [Cf. *For. Abstr.* 8 (No. 1453).]

1606. SMIT, B. **Control of soft scale.** *Fmg. S. Afr.* 25 (290), 1950 (144, 176). E.M.B.

Notes on soft scale insects with some practical recommendations for their control.

1607. THOMSEN, M., BUCHWALD, N. F., and HAUBERG, P. Angreb af *Cryptococcus fagi, Nectria galligena* og andre Parasiter paa Bøg i Danmark 1939–43. [**Attack of *Cryptococcus fagi, Nectria galligena,* and other parasites on Beech in Denmark, 1939–43.**] *Forstl. Forsøgsv. Danm.* 18 (2), 1949 (97–326 + 43 plates). 104 refs. [Dan.e.]

Observations were made between 1940 and 1943 on Beech forests severely attacked by *Cryptococcus fagi.* Trees from 20 to 100 years were attacked; differences in soil, water level, site class, etc., apparently had no particular significance, and a sudden change to more drastic thinning seemed to favour the attack. *C. fagi* was always the primary parasite. On young trees, the densest coccid population was generally found near the ground, and in older trees higher up, sometimes just below the crown. When the attack was not too severe, disappearance of the scale, naturally or after spraying, was followed by complete recovery, but in more serious cases the bark was too much damaged. On most of the Beeches studied (80 years old and over), where many coccids were present, an area of dead or dying cells appeared on the bark, fine cracks formed on the outer surface, and a yellowish liquid accumulated in the dead tissues, loosening the bark and seeping through to the surface to form a 'slime-flux'. Where a number of slime-flux spots occurred close together the whole area died and callus was formed by the living bark. *Nectria galligena* attacked the trees through cracks caused by the coccids or those caused later by the slime flux. In the following year, there was loosening and shedding of the bark in areas that had been heavily infested. Secondary and tertiary attacks were made by *Xyloterus domesticus* and *Hylecoetus dermestoides,* by sapwood fungi (e.g. *Stereum hirsutum* and *Polyporus adustus*) and finally by heartwood fungi (e.g. *Fomes* spp.). It is tentatively suggested that the attack may have been caused by high summer temperatures between 1930 and 1939, plus the low water table, and the natural decline of the attack, soon after the beginning of the investigation, by low winter temperatures between 1939 and 1942. Because of the natural decline of the attack, the value of a commercial miscible oil spray used cannot be estimated; its cost would be economically justified if it proved effective.

1608. TAL'MAN, P. N. O rogokhvostakh *Sirex gigas* L. i *Xanthosirex tardigradus* Ced. (Hymenoptera, Siricidae). [**The woodwasps *Sirex gigas* and *Xanthosirex tardigradus.***] *Entomologicheskoe Obozrenie, Moskva* 30 (1/2), 1948 (82–7). 1 ref. [Russ.] X.

In studies in Chita Province, Transbaikalia, in 1937–38, the following woodwasps were recorded: on *Larix dahurica*—*Sirex gigas, Xanthosirex tardigradus, Paururus juvencus* and *Xeris spectrum*; on *Pinus sylvestris*—*S. gigas, P. juvencus, P. noctilio* and *P. ermak*; and on *Betula* sp.—*Tremex fuscicornis* and *Xiphydria popovi.* The commonest of these were *X. tardigradus* and *S. gigas,* and the paper is devoted to details of the bionomics of these two species.

X. tardigradus, the male of which is described for the first time, attacked Larch only, and appeared to prefer freshly felled timber, though it also attacked weakened standing trees. The adult flight period was from June 22 to 1 August. Females oviposited only on log ends or where the bark had been partly removed by damage of one kind or another. On the other hand they did not oviposit where the bark had been completely removed, but only near the boundary of exposed wood with the bark. The life cycle in the laboratory lasted 2 years. Adult males lived 3–7, and females 8–13 days. The larvae tunnelled to a depth of 6 cm. and the pupal stage lasted 9–12 days in the two examples recorded.

S. gigas had a flight period lasting from 22 June to 3 Sept. It attacked both Pine and Larch, ovipositing in comparatively vigorous as well as weakened trees and being one of the

first secondary pests to do so. In the laboratory, its life cycle lasted 2 years, and adults, whether male or female, lived only for about 5 days.

1609. RAWLINGS, G. B., and WILSON, N. M. ***Sirex noctilio* as a beneficial and destructive insect to *Pinus radiata* in New Zealand.** *N.Z. J. For.* 6 (1), 1949 (20–9). 9 refs.

This article is intended as a supplement to a previous paper [see *For. Abstr.* 11 (No. 721)] on *Sirex noctilio*. Drought is postulated as the main cause of the *Sirex* epidemic, and details of the summer rainfall are given. The effects of silvicultural operations and the relation between overstocking, drought and *Sirex* attack are discussed. Various aspects of *Sirex* and its symbiont are briefly dealt with. An account is given of the benefits derived from the natural thinning due to *Sirex* attack, the damage to trees attacked but not killed, and the signs of recovery by the trees from the effects of adverse conditions. The possibility of biological and chemical control measures are discussed and the epidemic is compared with similar occurrences in other parts of the world. The main purpose of the paper is to record the progress of the *Sirex* epidemic and to place the emphasis on the general principles of climate, silviculture and site rather than on the insect itself. *From authors' summary.*

1610. REYNOLDS, R. R. **Defoliation by sawfly retards Pine growth.** *Sth. For. Note Sth. For. Exp. Sta.* No. 60, 1949 (4).

Representative forest-grown Shortleaf and Loblolly Pines (16 defoliated and 16 not defoliated by *Neodiprion banksianae*) were felled late in 1948 and their stems analysed. The defoliated trees had lost at least 75% of their needles in 1947, but had escaped in 1948. To eliminate variations in growth from other causes, each defoliated tree was paired with a neighbouring tree that was undamaged but otherwise similar. Measurements showed that heavy defoliation had retarded diameter and volume growth by 51% the first and 29% the second year.

1611. FERRARA, G. La lida del pino nelle pinete abruzzesi. **[The Pine sawfly [*Acantholyda nemoralis*] in the Pine woods of the Abruzzi.]** *Ital. for. mont.* 5 (2), 1950 (77–9). [It.f.]

A serious infestation of pure plantations of Austrian Pine shows no signs of responding to chemical control measures. The author considers that the only solution of the difficulty is to convert these already mature plantations into mixed stands. [Cf. *For. Abstr.* 9 (No. 2586); 12 (No. 1103).]

1612. SMITH, C. C. **Notes on the European winter moth [*Operophtera brumata*] in Nova Scotia.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (2), 1950 (1).

Adults reared from larvae believed to be those of the spring cankerworm (*Paleacrita vernata*), found in numbers in Nova Scotia, were identified as the European winter moth (*Operophtera brumata*). This is the first record of the occurrence of this insect in North America. It was found on a wide variety of hosts: Apple, Choke Cherry, Red Maple, Hawthorn, Basswood, Oak, Elm, White Ash, Hop Hornbeam, White Birch, and Yellow Birch. The seasonal history and habits of this insect are very similar to those of the fall cankerworm, and the same control measures will very probably be effective.

1613. HELM, A. Massenauftreten des Wollafters, *Eriogaster lanestris* L. **[Outbreak of *E. lanestris*.]** *Anz. Schädlingsk.* 23 (7), 1950 (104–6). 14 refs. [G.] [Pflanzenschutzamt Dresden.]

The pest was found defoliating a Lime avenue in the municipality of Köbeln, Saxony, in 1949, flowers remaining untouched. Details of the life history of *E. lanestris* are presented. No control measures were undertaken and no parasites discovered.

1614. GÄBLER, H. Die Nonnentachine in ihrer Beziehung zur chemischen Nonnenbekämpfung. **[The nun moth tachinid in connexion with chemical control of the nun moth.]** *Zeitschrift für Naturforschung, Wiesbaden* 3*b* (1/2), 1948 (61–3). 6 refs. [G.] L.S.

Since the flight season of the tachinid (*Parasetigena segregata*) begins (depending on elevation and temperature) some time after the emergence of the nun-moth caterpillar, damage to the adult parasites from insecticidal dusts can be avoided if dusting takes place in the period between emergence of the nun-moth caterpillars and the tachinid flight season.

The success of such an operation is illustrated by data from observations made in 1944 during control operations with dinitro-*o*-cresol in the Thüringer Wald.

1615. KALANDRA, A. Ochrana lesů a zemědělských kultur poprašováním insecticidy z letadel v Československu. [**The protection of forest and agricultural crops by aerial dusting with insecticides in Czechoslovakia.**] *Ochr. Rost.* 23 (1), 1950 (24–32). 16 refs. [Cz.russ.] E.M.B.

[Cf. *For. Abstr.* 12 (No. 751).] The present paper reports excellent results with 5% DDT (Gesarol) at rates of 30–50 kg./ha. against *Lymantria monacha*, *L. dispar*, and *Dendrolimus pini*, in 1949.

1616. [PREBBLE, M. L.] **The battle of the budworm.** *Pulp Paper Mag. Can.* 51 (7) 1950 (148, 150, 152–5).

A survey of Canadian experiments in chemical control, especially by aerial spraying with DDT between 1944 and 1946.

1617. LEJEUNE, R. R. **The effect of Jack Pine staminate flowers on size of larvae of the Jack Pine budworm, *Choristoneura* sp.** *Canad. Ent.* 82 (2), 1950 (34–43). 11 refs. (*Contr. Div. Ent. Dep. Agric. Can.* No. 2647.) [Dominion Forest Insect Laboratory, Winnipeg.] O.R.S.

1618. LEJEUNE, R. R., and BLACK, W. F. **Populations of larvae of the Jack Pine budworm.** *For. Chron.* 26 (2), 1950 (152–6). 2 refs. (*Contrib. Div. Ent. Dep. Agric. Can.* No. 2677.)

Field studies at Hawk Lake, Ontario, from 1942 to 1948, show that population levels of the Jack Pine budworm (*Choristoneura* sp.) are closely associated with the abundance of male Jack Pine flowers. This relationship is shown in 2 ways: (1) in infested areas the greatest number of larvae are found on male flowering trees, and (2) the density of budworm populations and the incidence of male flowers and male flowering trees generally fluctuate together. [Cf. *For. Abstr.* 10 (Nos. 2273–4); 11 (No. 1484).] *From authors' summary.*

1619. JAHN, E. Die Polyederkrankheit und andere Ursachen des Massensterbens des grauen Lärchenwicklers im Jahre 1948. [**The polyhedral disease and other causes of the mass dying-out of *Grapholitha* (*Semasia*) *diniana* in 1948.**] *Sonderheft, Carinthia II, Mitteilungen des naturwissenschaftlichen Vereines für Kärnten, Klagenfurt* No. 12, 1949. pp. 22 + 6 photos. 18 dgms. 11 refs. [G.]

Describes the 1946–48 Larch tortrix outbreak in Tyrol and, particularly, its rapid disappearance in 1948. The apparent causes of the latter were (in order of increasing importance): (1) insect predators, (2) parasitism and (3) polyhedral disease. It was found that various parasites attacked *Semasia diniana* as well as other animals (insects) associated with this species, and that polyhedral disease affected not only *S. diniana* but also associated animals and their parasites. A new method is described of preparing smear specimens of the decomposed body tissues and fluids of *S. diniana* attacked by polyhedral disease. [Cf. *For. Abstr.* 11 (No. 2298).]

46. DAMAGE BY MAN

1620. GRASSO, V. Caratteristica cicatrizzazione di tiglio americano. [**Peculiar callus formation on a wounded American Lime [*Tilia americana*].**] *Ital. for. mont.* 5 (2), 1950 (62–6). 5 refs. [It.f.e.]

47. INJURIES OF ALL KINDS TO INDIVIDUAL TREE SPECIES

1621. BARTER, G. W., and BALCH, R. E. **On the apparent spread of Birch 'dieback'.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (3), 1950 (1).

In order to discover possible correlations between spread of 'dieback' of Yellow Birch in the Maritimes and dry periods, studies have been made of the ring growth of Yellow Birch throughout the affected area. Hard Maple and Beech were used as controls. The following conclusions have been drawn:—(1) There is a fair correlation between the growth of the 3 hardwood species and precipitation up to the time of the appearance of 'dieback'. After this time, the growth of Maple and Beech continued to fluctuate normally, while that of Birch dropped rapidly. (2) The time of appearance of abnormal reduction of growth was not related to age, or rate of growth, although the eventual damage has been greater in the older or slower growing trees. (3) Reduced growth due to 'dieback' occurred on

Cape Breton Island 10–11 years later than in Central New Brunswick; at intermediate points in Nova Scotia it occurred about 5 years later, in N.W. New Brunswick about 4 years later, and in the Gaspé peninsula about 6 years later. These results coincide with reports of appearance of symptoms. (4) There is no corresponding difference in the precipitation data for these regions. (5) Unless more exact methods of measuring the effects of precipitation deficiencies and other meteorological factors in the physiology of Birch can be devised, based on greater knowledge of the seasonal water requirements of the tree, it is not possible to explain 'dieback' as a direct result of drought. The apparent spread of the symptoms suggests that an organism or virus is involved.

5. MENSURATION. INCREMENT. YIELD

52. MEASUREMENT OF TREES AND TIMBER

52.1. *Diameter*

1622. HEBB, E. A. **Caliper for small stems.** *J. For.* 48 (5), 1950 (369–70). 3 refs.

The common instrument for measuring large numbers of small stems in studies of reproduction etc. is the tree fork [cf. *For. Abstr.* 3 (215)]. Such an instrument is too long for easy use in brushy areas and the caliper here described attempts to avoid this by placing two short gullets base to base. A model with two gullets side by side proved difficult to use in brush.

52.3. *Form. Taper*

1623. SETH, S. K. **Taper curves for *Acacia catechu* (Khair).** *Indian For.* 76 (5), 1950 (198).

52.4. *Measurement of Volume*

See also *For. Abstr.* 12 (No. 1315).

1624. BECKER, M. E. **Forest survey procedures for area and volume determination.** *J. For.* 48 (7), 1950 (465–9).

An account of the methods employed in the U.S. Forest Survey.

1625. STOFFELS, A. De berekening van het totale grondvlak, het gemiddelde grondvlak en de gemiddelde diameter van de opstand van proefvakken. **[The determination of total basal area, mean basal area and mean diameter of the stands on sample plots.]** *Ned. Boschb.-Tijdschr.* 20 (11; 12), 1948 (331–41; 352–8). 20 refs. [Du.e.]

Gives formulae for calculating basal areas and diameters, with factors for correcting errors due to the deviation of the stem from the circular and to the classification of diameters.

1626. ANTONIOTTI, G. B. Tavola dendrometrica del faggio del Molise cresciuto in fustaia disetanea. **[Volume table for Beech in selection forest in Molise.]** *Ital. for mont.* 5 (3), 1950 (115–20). [It.f.e.]

56. INCREMENT

See also *For. Abstr.* 12 (Nos. 956–8, 965–7, 1043, 1046, 1048, 1059).

1627. **A 10-year record of growth in Utah Juniper.** *Rep. Sthwest. For. Range Exp. Sta. 1939*, 1950 (45–6).

Juniperus utahensis is a relatively slow growing tree. Diameter growth (at stump height) for all trees on a 4-acre plot averaged only 0·41 in./decade.

57. DEVELOPMENT AND STRUCTURE OF STANDS. YIELD

See also *For. Abstr.* 12 (No. 1114).

1628. CUTTEN, E. Y. **Permanent sample plots in New Zealand exotic forests.** *N.Z. J. For.* 6 (1), 1949 (45–50). 4 refs.

1629. TAYLOR, R. F., and GODMAN, R. M. **Increment and mortality in southeast Alaska's second-growth stands.** *J. For.* 48 (8), 1950 (329–31).

Second-growth stands, consisting of about half Sitka Spruce and half Hemlock [*Tsuga heterophylla*] by volume, produce double the average volume of the climax forests in about 80 years. Diameter growth of Spruce is faster than that of Hemlock, except in very young stands, and increases with the diameter of the tree. Diameter growth of Spruce by vigour

classes is usually greater than that of Hemlock of the same vigour class. Within species, each vigour-class growth rate is at least double the next lower rate. Within diameter classes, the mortality % of Spruce is greater than that of Hemlock, but the total mortality of Hemlock exceeds that of Spruce. Volume growth of Spruce is greater than that of Hemlock except in trees of very small diameters, and increases with the diameter of the tree. Vigour 1 and 2 Spruce and Vigour 1 Hemlock should be selected as crop trees in stands selected for thinning and pruning. *Authors' summary.*

1630. BENSON, R. W. **Growth and yield of Red Pine.** *Paper Tr. J.* 130 (19), 1950 (30, 45). P.R.

Measurements of *Pinus resinosa* between 20 and 34 years, in the northeastern U.S.A., show that plantations in New York State are developing at least as well as natural stands in Minnesota, and with gradual thinning to a final crop density of *ca.* 200 trees/acre should equal or exceed the latter even on heavy soils. Growth data for 8 plantation sample trees are presented. [Cf. *For. Abstr.* 5 (255).]

1631. HILF, H. H. Die Massenleistungen von Pappel und Weide und die Verwertungsaufgaben bei diesen Holzarten. [**Volume yields of Poplar and Willow and utilization problems of these wood species.**] *Papier, Darmstadt* 4 (1/2), 1950 (1–5). [G.] L.S.

Discusses the value of Poplar and Willow as raw material for wood-pulp and cellulose manufacture. In order to bring down the price of Poplar wood, the author suggests considerable increase of Poplar cultivation and discusses this subject in some detail. [Cf. *For. Abstr.* 12 (No. 1109).]

1632. PICCAROLO, G. Qualche dato sulla produzione legnosa cormometrica di fustaie coetanee di pioppi, cresciute nei terreni golenali del Casalese (prov. di Alessandria). [**Some mensurational data on the growth and yield of even-aged stands of Poplar in the floodlands of Casale (Alessandria Province).**] *Monti e Boschi* No. 6, 1950 (266–8). [It.]

The following data are tabulated for (unidentified) hybrid Poplar grown (*a*) at 400, (*b*) at 250 to the hectare, at all ages from 4 to 25 years:—mean d.b.h., total height, volume per ha., c.a.i., m.a.i., assortments, and value of products obtainable per ha. in 1949 and 1950.

1633. PATRONE, G. Ricerche dendrometriche sul pioppo del Canadá cresciuto a filari. [**A mensurational study of 'Canadian' Poplar grown in rows.**] *Ital. for. mont.* 5 (3), 1950 (121). [It.]

Measurements were made of 199 trees, 13 years old, growing in single rows along forest roads, with d.b.h. of 15–45 cm. A table gives total height and stem volume including bark by 5-cm. diameter classes.

1634. WIEDEMANN, E. Ertragstafeln der wichtigsten Holzarten bei verschiedener Durchforstung sowie einiger Mischbestandsformen, mit graphischen Darstellungen. [**Yield tables for the chief tree species [of Germany] under various grades of thinning and for several types of mixed stand, with graphical illustrations.**] M. & H. Schaper, Hannover. 1949. pp. 100. [G.]

Tables for Beech, Oak, Common Alder, Ash, Birch, Norway Spruce, Scots Pine, European Larch, Douglas Fir, Oak/Beech, Norway Spruce/Beech, Scots Pine/Beech, and Scots/Pine/Norway Spruce stands.

6 MANAGEMENT WORKING PLANS. SURVEYS

See also *For. Abstr.* 12 (Nos. 1062, 1648–9, 1653, 1657).

61. SURVEYING. MAPPING

See also *For. Abstr.* 12 (Nos. 993–4, 1624).

1635. KADAMBI, K. [**How to construct and use] a simplified planimeter.** *Indian For.* 76 (5), 1950 (196–7 + 1 photo).

1636. THOMSON, A. P. **Technical developments in air survey and the interpretation of forestry data therefrom—N.Z. experience.** *N.Z. J. For.* 6 (1), 1949 (39–44). 5 refs.

Cf. *For. Abstr.* 9 (Nos. 1351–2), 11 (No. 2372).

1637. GARVER, R. D., and MOESSNER, K. E. **Forest service use of aerial photographs.** *Photogrammetric Engineering, Washington* 15 (4), 1949 (504–17). L.S.

64. DESCRIPTION OF SITE. ASSESSMENT OF SITE AND STAND QUALITY

See also *For. Abstr.* 12 (No. 928).

1638. GESSEL, S. P., and LLOYD, W. J. **Effect of some physical soil properties on Douglas-Fir site quality.** *J. For.* 48 (6), 1950 (405–10). 4 refs.

A forest soil-site survey in N.W. Washington in 1949 indicated that Douglas Fir site quality could be predicted from data on soils. Site index on all soils examined, increased with change in texture from coarse to light. Medium-textured soils of different profile groups did not differ significantly in site index. Depth of soil was an important factor for those soils underlain by a hardpan or by bedrock. Site index on the same soil profile and texture group, was related to mean annual precipitation. Site index on well drained soils increases with annual precipitation up to 40 in. and decreases for higher rainfalls, irrespective of soil texture. Site index on soils underlain by an impermeable layer, increased with precipitation up to 60 in.; the greatest increase was up to 40 in., and above this amount, the change in site index was small. [Cf. *For. Abstr.* 10 (No. 3016).]

1639. GUPTA, R. S. **A note on the practical application of the recommendations made in the *Indian Forest Bulletin* No. 141, regarding the forecasting of the quality of Teak from the soil and site characteristics.** *Indian For.* 76 (5), 1950 (210–4 + 4 gphs.).

[Cf. *For. Abstr.* 11 (No. 2494).] The field laboratory methods are given for determining (1) ratio of SiO_2 to sesquioxides, (2) dispersion coefficient, (3) depth of permanent moisture availability, and aspect, together with a list of necessary apparatus and chemicals.

66. YIELD REGULATION. SUSTAINED YIELD

1640. SCHAEFFER, L. Une méthode d'aménagement bien démodée. **[A thoroughly out-of-date method of management.]** *Rev. for. franç.* No. 6, 1950 (309–16). 5 refs. [F.]

A criticism of the fixed periodic block system, on the grounds of its lack of flexibility.

67. WORKING PLANS

1641. CZURAJ, M. Projekt praktycznego ujęcia planu urządzenia gospodarstwa leśnego. **[Proposals for the practical formulation of a forestry working plan.]** *Las Polski* 23 (11/12), 1949 (22–5).

Includes forms for compartment descriptions and control of fellings and afforestation work.

7. FOREST ECONOMICS, VALUATION, AND FINANCE

See also *For. Abstr.* 12 (Nos. 1109, 1122, 1125, 1225, 1556).

1642. STREYFFERT, T. Skogskulturåtgärdernas ekonomi. **[The economics of artificial regeneration.]** *Skr. K. Skogshögsk., Stockh.* No. 1, 1949. pp. 54. 18 refs. [Sw.e.]

The maximum cost (C max.) allowable for artificial regeneration, is defined as the cost covered without profit by the expected increase in income. Formulae are given for calculating C max. when: (1) there would be no waiting period before natural regeneration took place; (2) there would be such a waiting period; (3) it is assumed that the artificial stand will be more closely stocked than a natural one; or (4) seeds or plants obtained by tree-breeding are expected to give a higher financial yield. When long-term measures are taken in the national interest to maintain the future yield, or when a woodworking concern that owns forests is anxious to maintain its future supplies, higher costs may be allowable. In farm woodlands, labour costs should be related to labour already available on the farm. Graphs showing the cost of regeneration in relation to various factors have captions in English and Swedish.

9. FOREST POLICY

90. GENERAL PRINCIPLES OF FOREST POLICY

1643. **The work of FAO—FAO's program for forestry and forest products as reviewed by the fifth session of the FAO conference.** *Unasylva* 4 (2), 1950 (81–5).

1644. Problemas forestales de África. [**Forest problems of Africa.**] *Montes, Madrid* 6 (32), 1950 (203–14). [Span.]

1645. HUNT, L. G. **Colonial timbers.** *Colonial Development* No. 1, 1950 (10–11). X.
A short summary of the policy of the Colonial Development Corporation in relation to forestry.

91. SOCIAL AND ECONOMIC INFLUENCE OF THE FOREST. NATIONAL PARKS. RESERVES. FOREST INFLUENCES

See also *For. Abstr.* 12 (No. 1102, 1122).

91.1. *Rural Preservation. Reserves. National Parks. Plant and Animal Protection*

See also *For. Abstr.* 12 (No. 1586).

1646. **National Forest Park Guides: Glen Trool.** For. Comm., Lond. 1950. pp. 77 + 3 maps. Price 3*s.*

1647. **Britain's forests: Kielder.** For. Comm., Lond. 1950. pp. 17. Price 6*d.*

1648. NIEDZIAŁKOWSKI, W. Wytyczne urządzenia gospodarstwa rezerwatowego wraz z programem prac inwentaryzacyjnych i organizacyjnych w rezerwatach leśnych. [**Directives for planning the management of forest nature reserves, including a programme of inventory and organizational work.** *Rozpr. Spraw.* (*Ser. A.*) *Inst. Bad. Leśn.* No. 60, 1949. pp. 88. [Pol.russ.e.]
The idea of active intervention as part of forest nature protection is expounded, following Kostyrko; in order to preserve the objects protected (plant associations, rare plants, fauna, etc.), the intervention of man is in most cases necessary, and this involves planning. The concept is enlarged upon for specific cases. A subject index is included.

1649. W[YATT]-S[MITH], J. **Virgin jungle reserves.** *Malay. Forester* 13 (2), 1950 (92–4).
Rules governing the lay-out and maintenance of virgin-jungle reserves in Malaya have been drawn up as follows:—(1) One or more 'virgin' jungle reserves will be established in each large forest reserve of economic value, i.e. those of lowland Dipterocarp forest and swamp forest formations. (2) In forest reserves of very varied topography, two or more jungle reserves will be selected, so as to include the different forest formations present. (3) Jungle reserves will be selected and demarcated when a compartment system is being prepared, and selected provisionally when the extraction system is being laid out before exploitation, or before the first exploitation permits are issued. (4) Jungle reserves will be considered as compartments within the compartment system, and given a serial number accordingly. (5) Jungle reserves must be easily accessible by road. (6) They should be about 100 acres in area and compact in shape, and in no case less than 25 acres in area or 10 chains in width. (7) They should, if possible, have well defined natural boundaries. (8) They must be marked on the forest reserves map and noted in the reserves records. (9) Boundaries of jungle reserves must be maintained and clearly marked as such. (10) Permittees must be warned against the felling of trees from neighbouring areas into jungle reserves, and a clause to this effect included in their permits. (11) No cutting of any kind will be made in a jungle reserve apart from that required for the demarcation of any sample plots.
Rules are also given to ensure that the Silviculturist and Forest Botanist shall be consulted on the establishment of jungle reserves, and that proper records shall be kept.

1650. MULLERRIED, F. K. G. Conviene establecer parques nacionales en el estado de Chiapas. [**The advisability of creating national parks in the state of Chiapas.**] *Bol. Direcc. for. Caza, Méx.* Jan./Dec., 1949 (31–4). [Span.]
Suggests districts suitable for the establishment of national parks.

1651. **Annual report of the Game Department, Federation of Malaya, for the year 1949.** [1950.] pp. 15 + 9 + map.

Owing to decentralization, consequent on the inauguration of the Federation of Malaya, deals mainly with the King George V National Park. Includes an historical survey of the Game Laws and Game Department. Electric fencing has proved successful against seladang, deer and elephant.

1652. HILL, R. R. **Forest wildlife management in the Rocky Mountain region.** *J. For.* 48 (6), 1950 (419–22). 4 refs.

91.3. *Influence of the Forest on the Environment*

See *For. Abstr.* 12 (Nos. 921, 923, 940–1, 1121).

94. FOREST OWNERSHIP. CO-OPERATIVES

1653. **The dedication of woodlands: principles and procedure.** *Bookl. For. Comm., Lond.* No. 2 (2nd ed.), 1950. pp. 53. Price 1*s.* 6*d.*

See *For. Abstr.* 9 (No. 2660).

1654. E., J. D. D., and H., C. H. R. **The private forest-owner in Finland.** *Quart. J. For.* 44 (3), 1950 (147–8).

Mainly an account of the relevant clauses of the Forestry Acts of 1929 and 1948.

97. POLICY REGARDING THE RELATION OF THE FOREST TO AGRICULTURE, PASTURE, AND INDUSTRY

See also *For. Abstr.* 12 (No. 937).

1655. WADSWORTH, F. H. **Notes on the climax forests of Puerto Rico and their destruction and conservation prior to 1900.** *Carib. For.* 11 (1), 1950 (38–56). 41 refs. [E.Span.] [U.S. trop. For. Exp. Sta.]

A brief history of land use and forest conservation in Puerto Rico, with an attempt to draw a reconstructed picture of the climax forests in pre-Columbian times.

1656. NORTHUMBERLAND, DUKE OF **Farming and forestry. The national policy examined.** *Scot. Agric.* 29 (3), 1949–50 (119–27). O.R.E.

A summary of salient points of papers read at the British Association meeting at Newcastle-on-Tyne in September 1949, and dealing with the Forestry Commission's afforestation programme and its effects on farming.

1657. COPE, J. A. **Farm forestry in Finland.** *J. For.* 48 (7), 1950 (470–3).

FORESTRY THE WORLD OVER

References: 1. *Annual Report of the Forestry Commission, Victoria*, 1948-9; 2. *Bois et Résineux*, Bordeaux; 3. *Botanicheski Zhurnal*, Moscow; 4. *Chemie-Ingenieur-Technik*, Frankfurt a. M.; 5. *Comptes rendus de l'Académie des Sciences*, Paris; 6. *Engineering News Record*, New York; 7. *FAO Press Release*, Washington; 8. *Foreign Commerce Weekly*, Washington; 9. *India News*, London; 10. *Indian Forester*, Lahore; 11. *Italia agricola*, Rome; 12. *Journal of Forestry*, Washington; 13. *Modern Plastics*, Easton, Pa.; 14. *Mundo maderero*, Buenos Aires; 14a. *Nature*, London; 15. *News Bulletin of the Canadian Pulp and Paper Ass.*, Montreal; 15a. *Orman ve Av*, Ankara. 16. *Paper Trade Journal*, New York; 17. *Report of the Chief Conservator of Forests, Sudan*, Khartoum; 18. *Shade Tree*, Kearney, N.J.; 19. *Timber of Canada*, Ottawa; 20. *Timber Trades Journal*, London; 21. *Timberman*, Portland, Ore. 22. *Unasylva*, Washington; 23. *Wood Products*, Chicago; 24. *Wood-Worker*, Indianapolis.

Conferences. Among the recommendations of the 3rd session of the FAO European Commission on Forestry and Forest Products which met in Geneva 28 Aug.-1 Sept. 1950, were the following:— That the scientific and technical aspects of reforestation should continue to be the responsibility of the International Union of Forest Research Organizations, and that the Commission should restrict its own work to matters concerning policy and finance. That FAO should collect and circulate information on national legislation relating to insect pests and fungus diseases in forests. That study of soil conservation, restoration, and improvement should be entrusted to an *ad hoc* Commission to be linked with FAO.. That a Working Party be set up to study the technical aspects of torrent control and soil restoration in mountainous regions (**7**; 12.9.50).

Australia. Regeneration in the mountain forests of Victoria after the disastrous fires of 1939 is particularly satisfactory, not less than 95% of the burned area being effectively re-established with a new crop. Growth has been rapid and it will soon be economically practicable to remove commercially valuable thinnings from the more advanced stands (**1**; 1950).

Bechuanaland. An uncommon and interesting use of television in fighting forest fires appears to have been applied for the first time in Bechuanaland. In April 1949, two planes, one equipped with a television camera and the other used as a relay, were flown along the front of a vast forest fire stretching for about 20 km. The pictures televised gave the Forest Inspector in his office a general view of the advance of the fire and of the various phases of the struggle against it and assisted him in making decisions on the strategy of the fight (**22**; July-Sept. 1950).

Burma. The Government of Burma has signed an agreement with FAO providing for the services of an expert for about 3 months to advise the Government on the possibility and advisability of setting up an integrated forest industry in Burma (**7**; 20.9.50).

Canada. The Alberta fires which started about 21 Sept. after an unprecedented spell of warm weather have caused country-wide concern because of the smoke pall which covered Canada and part of the U.S.A. as far as the east coast. It has been suggested that the 'blue moon' seen recently in England and over the North Sea was caused by the same smoke. At one time it was estimated that about 700 persons were engaged in fighting these fires, the biggest of which burned over 100 sq. miles (**15**; Sept. 1950).

During 1949, forest fires numbered 1,082, ravaging 2,782,656 acres of forest and destroying a volume of wood equal to half the annual consumption of the Canadian pulp and paper industry (**16**; 10.8.50).

The lumber industry has recently perfected a new soil improver, tentatively called Fersolin, which is essentially sawdust treated by simple chemical means. Preliminary tests of its use in growing vegetables indicate that it encourages higher rates of seed germination, earlier ripening, and increased weights (**19**; Oct. 1950).

Colombia. The Government of Colombia has asked FAO for the assistance of a forestry expert for a minimum period of one year, to prepare a preliminary basic survey of the forest economy of the country and to formulate detailed proposals for a co-ordinated technical development programme in forestry (**7**; 20.9.50).

France. Wilting of Poplars along the Seine in Paris, and the removal or lopping of the affected trees, threaten considerable alterations to the aspect of some of the most famous parts of the city. The Île Saint-Louis in particular is badly affected by the disease, which is caused by *Ungulina fomentaria* var. *inzengae* (**5**; April 1950).

The Jimmy Berliet film company of Bordeaux has made a documentary film for general release, on the formation and exploitation of the Landes forests and the utilization of their products. The title of the film is 'Pignada', a Gascon word meaning a stand of *Pinus pinaster* (**2**; 30.10.50).

Germany. Dr. Olbrich of Nürnberg has developed a new method of planting Poplar, using 1-year rooted cuttings taken from stool shoots instead of the 2- or 3-year stock used hitherto. Cuttings are severed just above the lowest bud with an oblique cut at 45°. No root pruning is necessary as a rule, before planting out the rooted cuttings. The advantages claimed for this method are:—(1) more regular and vigorous development (mean height in the second year after planting out is *ca.* 1 m. greater than that of ordinary plantings); (2) reduction in nursery area; (3) reduction in labour; (4) great reduction in cost (**11**; 6.6.50).

Great Britain. The felling quota for hardwoods for the calendar year 1951 for England and Wales is to be reduced from 23,600,000 to 18,000,000 cu. ft. That for softwoods is to be increased from 2,300,000 to 3,000,000 cu. ft. (**20**; 28.10.50).

The new building of the Imperial Forestry Institute at Oxford was opened by Princess Margaret on 19 Oct. No fewer than 62 different species of home and Empire timbers have been employed in its furnishing and equipment, including 11 from Oceania, 10 from West Africa, 9 from Great Britain, and 5 from Canada. Panelling is executed in 10 different woods, 14 different kinds are used for floorings, 23 for doors, 13 for general furnishing, and 27 for furniture. Gifts of timber were received from almost every timber-producing country of the Commonwealth, and the University made a grant of money to enable them to be used. These timbers now provide, in the furnishing and equipment of the building, a permanent and far more practical exhibition of use than would have been supplied by the original plan for a collection of specimens in a central museum (**20**; 11.11.50).

Visitors to the 1951 Festival of Britain Exhibition will pass through an entrance having a roof supported by 5 parabolic, glued, laminated arches of *Pseudotsuga taxifolia*, each 162 ft. high at its apex, and with a span of 101 ft. The timber was given for the purpose by the timber industry of British Columbia, Canada (**22**; July-Sept. 1950).

Guatemala. In response to the request of the Government of Guatemala, two experts, one on forest conservation and flood control and the other on the protection of Pine forests from insect pests, will be sent to Guatemala by FAO for a period not exceeding one year. A function of both experts will be to train native staff to carry out the necessary protective measures (**7**; 20.9.50).

Hungary. Tests have been made of concrete reinforced with wood, and it has been concluded that:—(1) wood is an effective reinforcing material, (2) decay of wood properly embedded in concrete is not probable, and (3) wood-reinforced, pre-cast concrete poles are less breakable under the hammer than those reinforced with steel (**6**; 4.5.50).

India. The Travancore-Cochin Government recently carried out experiments for the preparation of wood pulp for the manufacture of artificial silk yarn. It was found that the indigenous species of Bamboo which is found in abundance in the forests of this state was very suitable (**9**; 7.10.50).

An interesting case of destruction of the fungus gardens of termites by the larvae of an unidentified tortricid has been observed. When the fungus is completely destroyed, the termites also perish. Several colonies of a mound-building termite (*Cyclotermes obesus*) were wiped out, and considerable

difficulties were encountered in maintaining the termites for test experiments in the laboratory (**9**; May 1950).

Kashmir. Two schemes have been launched in Kashmir for growing Wattle on an area of 21,000 acres. It is estimated that the plantations, when mature, will yield about 12,000 tons of bark per year (**9**; 16.9.50).

Mexico. A tannin-extraction plant at Alvarado, Mexico, is expected to be completed by the end of 1950, and arrangements are being made for the procurement of raw material (Buttonwood—*Conocarpus erectus*). Capacity is expected to be about 300 tons of tannin a month (8; 16.10.50).

Pakistan. The Pakistan Government is asking FAO for the loan of 3 experts to advise respectively on the setting up of a forest products laboratory, sawmilling and logging, and forest chemistry with emphasis on medicinal plants. They have also asked for travelling fellowships for forest officers to study afforestation techniques in arid countries (**7**; 12.9.50).

Peru. Cetico [*Cecropia* sp.], a quick growing tree found in abundance in eastern Peru, is a promising source of newsprint, according to tests made in Italy by Cartiera Giacomo Basso and in London. The species is at present little exploited and will supply most of the raw material for new pulping mills shortly to be established in Peru (**14**; Aug. 1950).

Southern Rhodesia. Rhodesia Plastics Ltd., Salisbury, manufacture flower-pots from urea plastics. Plants grown in these can be planted out without transplanting, since the pot soon decomposes when embedded in the soil. The formaldehyde constituent of the plastic is said to keep insect pests away (**4**; 28.9.50).

Sudan. The Bird Control Officer attached to the Agricultural Research Division exploded several tons of gelignite among roosts of grain-eating sparrows in low-lying parts of certain reserves in the southern Blue Nile Circle, and succeeded in killing 45,000 birds with one blast. These pests cause serious damage to *Acacia arabica* plantations in the pole stage, in addition to their depredations among grain crops (**17**; 1950).

Tropical Africa. A meeting, attended by twenty-one botanists interested in the flora of tropical Africa, and representing six different institutions, was held in the Herbarium of the Royal Botanic Gardens, Kew, on 15 Sept. 1950. It was unanimously decided to form an association of botanists interested in the taxonomy of tropical African plants, with a view to increasing international collaboration among such botanists, and of correlating the taxonomy and nomenclature in regional floras (Angola, Belgian Congo, Tropical East Africa etc) now in preparation. At a later meeting, Mr. R. D. Meikle, of the Royal Botanic Gardens, Kew, was elected secretary, from whom information about the association can be obtained (**14a**; 2.12.50).

Turkey. As a result of the 3-day Conference convened in Ankara by the Minister of Agriculture on 17 June 1950, to consider the serious condition of forests and forestry in Turkey, a special Scientific Commission was appointed to put forward remedial proposals. Some of the Basic Principles of the report submitted by the Forestry Faculty in summer 1950 to this Scientific Commission were as follows:—

All forests should be distinguished and demarcated as protection or production forest. The present 'Exploitation Units' should be renamed 'State Forest Service'. All land, including the national forest estate, should be classified and delimited finally into forest proper, pasture, and arable, as soon as possible.

Where populations are pressing hard on the forest, resettlement should be considered as a first step. Village Forestry Units or Boards must be set up to unify the exercise of rights, supply forest labour, improve pasture conditions and foster rural industry.

The income from forests must be returned wholly to them for maintenance, reforestation and afforestation. In regions remote from forests, Rural Afforestation Units must be organized. The

setting up of a separate Forestry Research Centre and demonstration forests must not be delayed. A Higher Forestry Council must be set up. A Soil Conservation Service must be created (**15a**; Sept. 1950).

Uruguay. The FAO mission to Uruguay includes a forestry expert who will survey the whole field of forestry and forest products and frame recommendations for putting the forest economy of the country on a sound footing (**7**; 20.9.50).

U.S.A. The Bureau of Entomology and Plant Quarantine has instituted a forest insect survey to be carried on from headquarters at Beltsville, Md., and at 8 field stations located in different forest regions. A main object will be to co-ordinate the work of various agencies in their efforts to detect potentially dangerous infestations of forest insects in the early stages (**12**; Oct. 1950).

An appropriation of $2,000,000 has been made by Congress for a Forest Service programme to control the infestation of Engelmann Spruce bark-beetles in Colorado. A 1 : 6 mixture of orthodichlorobenzene and a low-grade fuel oil are being used. Some 65 miles of main level roads and 100 miles of jeep roads have been constructed, and transport has been hired from army depots. The 1950 programme is concentrated on the east side of infested areas. Trained surveyors and spotters inspect every tree and mark those that are infested and need treatment. Spraying machines and lorry-loads of chemicals follow the spotters, and the marked trees are sprayed, some to 30-35 ft. above the ground, others only to 5-10 ft. The cost of the treatment will be more than offset by the value of the timber saved, and by the amenity value of the forests (**21**; Sept. 1950).

Indications that scolytid vectors of Dutch Elm disease, like house flies and some mosquitoes, are becoming resistant to DDT, are reported from the Bartlett Tree Research Laboratories. Using bark from twice-sprayed Elms as breeding material, the chief entomologist contrived to rear as many as 644 beetles per cu. ft. of bark (**18**; Aug. 1950).

It is reported that dry-kiln operators are reducing fuel costs by insulating kilns with vermiculite. The vermiculite is used instead of sand in a concrete mix, and the slab obtained, usually 3-6 in. thick, is applied over the existing roof. Vermiculite concrete weighs only 25-35 lb./cu. ft. as against 150 lb. for ordinary concrete. Vermiculite is very resistant to fire and has a fusion point of 2,500° F. (**23**; Aug. 1950).

High-quality plastics are being made from Pine sander dust collected and graded by a special machine, at the Long Bell Lumber Co., Weed, Calif. Care is needed to keep the dust clean. Material from plywood sanders is not suitable, because particles of paper and glue are included. Fir dust cannot be used. Only the dust from door sanders has been found satisfactory. The dust collecting and grading plant has been in operation for two years. It produces about one car load of sacked Pine dust per month (**21**; Nov. 1950).

A process of extruding thermoplastics over wood has been developed by American Plastics Corp., New York. The plastic-covered dowels, slats, handles etc., are said to combine the strength of wood and the wear-resistance of plastic (**13**; 28.9.50).

A new type of woodworking plant is being set up in various parts of U.S.A., producing rough-dimension, semi-finished and finished-dimension converted timber from small, crooked, knotty and defective logs, tops and large branches of trees, slabs, edgings and trimmings, short-length lumber, plywood and factory waste (**24**; Oct. 1950).

U.S.S.R. A conference on 'forest typology' [the science of forest types] was convened by the Forest Institute of the Academy of Sciences on 3-5 Feb. 1950, under the chairmanship of its director, V. N. Sukachev. It was attended by many representatives of scientific bodies, the Ministries of Forestry and of Higher Education, forestry schools, and different branches of practical forestry. Six papers were read by leading workers in this field, and very lively discussions ensued. The conference resolved that there was no irreconcilable difference in principle between the two chief schools, headed respectively by Sukachev (*forest types* based primarily upon the ecological study of vegetation and fauna) and Pogrebnyak (*forest site types* based primarily on climatic and edaphic conditions). Both schools were found to be developing their ideas in line with dialectical materialism and Michurin biology, and the two approaches to the subject were adjudged to be necessary and

complementary. It was further resolved, *inter alia*, that work should begin on a comprehensive manual to be entitled *The Forest Typology of the U.S.S.R.*, and on a series of practical regional guides for all parts of the Union. The collaboration of all 'forest typologists' in the U.S.S.R. would be called for, and the organization of the whole project was entrusted to the Forest Institute of the Academy of Sciences. The resolution includes a first list of detailed points on which action is required, and recommends that further general and special conferences be called by the Forest Institute (**3**; May-June 1950).

Venezuela. The Government of Venezuela has requested FAO to send a forestry mission for a period not exceeding 24 months for any one member, to advise the Government on forest policy. The initial programme of the mission will be confined to projects related to (1) organization of a forest fire service, (2) collection of existing aerial surveys of Venezuela and training of staff in forest inventory work and interpretation of air photographs, (3) improvement of logging and sawmilling so as to prevent waste, and (4) improvement of soil-conservation methods. Later on, projects dealing with wood technology, anatomy and utilization, the establishment of a silvicultural experiment station, and the making of a forest survey, are envisaged (**7**; 20.9.50).